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JANUARY 193

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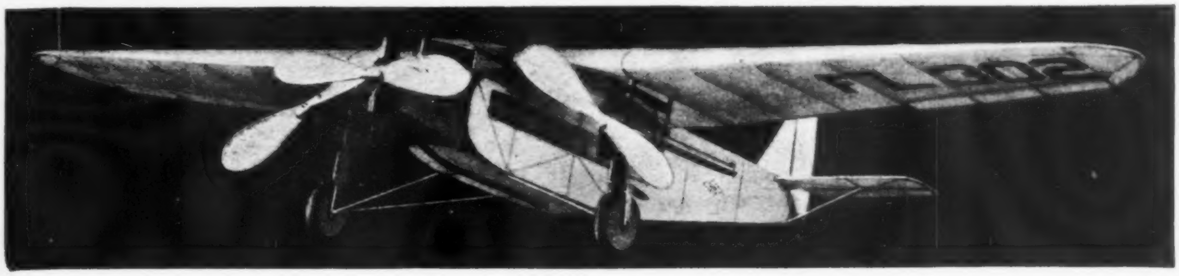

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MODEL AIRPLANE NEWS

Vol. IV **No. 1**

CONTENTS, JANUARY, 1931

Cover Design by Ray Creena—Drawn by Norman E. Jennett.

In Our Next Issue

In response to thousands of requests from our readers, MODEL AIRPLANE NEWS has secured plans for the famous "?" (*Question Mark*) flown by Costes and Bellonte from Paris to New York. These plans—full-size—for a perfect flying model will appear in our next issue.

That's not all!

Sometime ago we promised you plans for an *Helicoplane*. These plans, too, are in our next issue, and they're great! The *Helicoplane* plans are for a flying model that rises vertically, hovers, and then flies forward, descending vertically when the power has run out.

—o—

Then, of course, we have more of that famous *Gliding and Soaring* series by Percival and Mat White; to say nothing of further absorbing articles on *Aerial Navigation*, and *Airplane Designing* by those experts Capt. Leslie Potter and Ken Sinclair.

—o—

The *Macfadden Aviation Advisory Board* is back again to stay, so watch for it, and its instructive articles on aerial matters.

—o—

The Mystery of the Silver Dart continues to unfold the thrilling adventures of Ian Potter, and, in swift moving style, shows you what happens when the secret service takes a hand in unraveling any kind of mystery.

—o—

Don't forget February MODEL AIRPLANE NEWS! On all news stands January 23 next, and only 15 cents a copy!

You can't afford to miss it!

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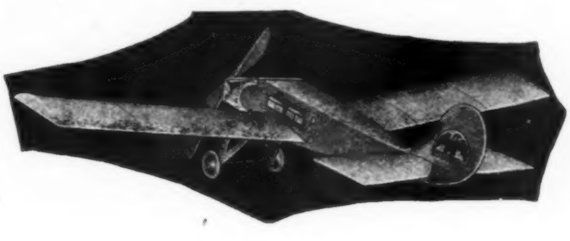

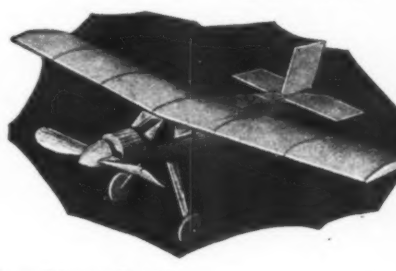

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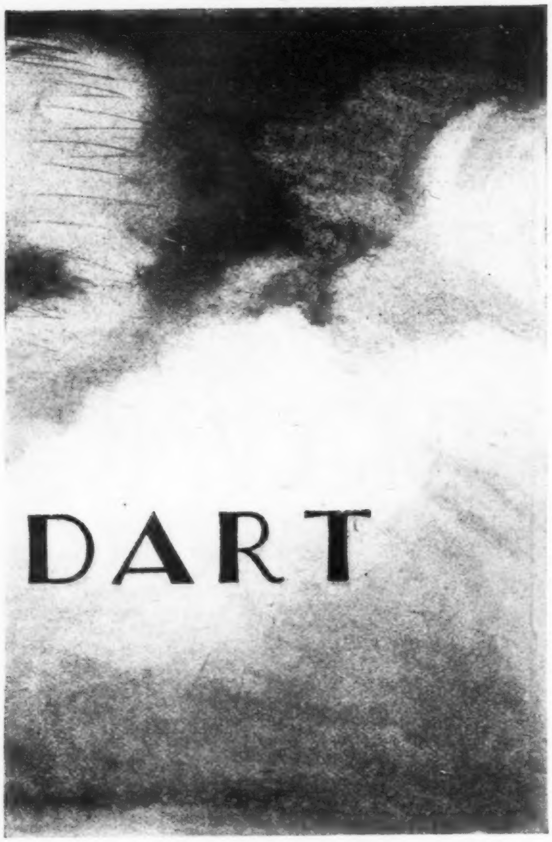
THE MYSTERY of the SILVER DART



By
RAY CREENA

A Secret Mission Is Undertaken—and a Plane Heads into Unknown Dangers

OFFICIAL Washington is staggered—though it gives no indication of its feelings—by the loss of the Silver Dart, *a new mystery single-seater fighter capable of 350 miles an hour and equipped with scientific devices, which put the American Air Corps years ahead of its closest rival.*

Rear-Admiral Beecham, Chief of the U. S. Secret Service, has been ordered to recover the plane or admit himself defeated and in danger of losing his position. While he is deliberating on a plan of action, Lieutenant Ian Potter, U. S. Army Air Corps, and son of one of America's outstanding heroes during the Great War, is announced.

Though only nineteen, Potter already had won for himself a great reputation as a flyer in the Air Corps. His deep knowledge of aeronautics had been fostered by the friendship and tuition of Captain Yubanks, known as the "Genii," a great friend of Ian's dead father, and by his own upbringing, which had included the study of wireless telegraphy, model airplane construction and sports in general.

During an aerial field day at Washington, Ian has taken two children of his superior officer for a flight. While taking off, a wheel had dropped from the undercarriage. The crowd is held spellbound by fear. Can Ian bring the plane down safely? There is a bump, a crunching sound...

HEARING the bump and the crunching, people closed their eyes—afraid to look and fearing the worst. There was a deathly silence for several moments.

"Wow! He's done it! Wow and hot diggity dog!"—this from Ian's mechanic. Across the field he dashed, waving his arms and yelling his head off for joy. The crowd took up the cry, "He's done it!" and then there came a roar of cheering such as never was heard before.

Commander and Mrs. Stevens were among the first to reach the Fokker. Ian was stepping down from the plane as they arrived. He saluted Commander Stevens.

"I'm sorry, sir," said Ian, and bowing to Mrs. Stevens, added, "I hope you were not worried too much, ma'am. It was nothing. There really wasn't much danger." Both thanked him many times and turned to help the children out.

"Shucks," said Stevens, Jr., "call that a flight? Thought we were going to stay up for a few hours." His sister showed him the way in politeness.

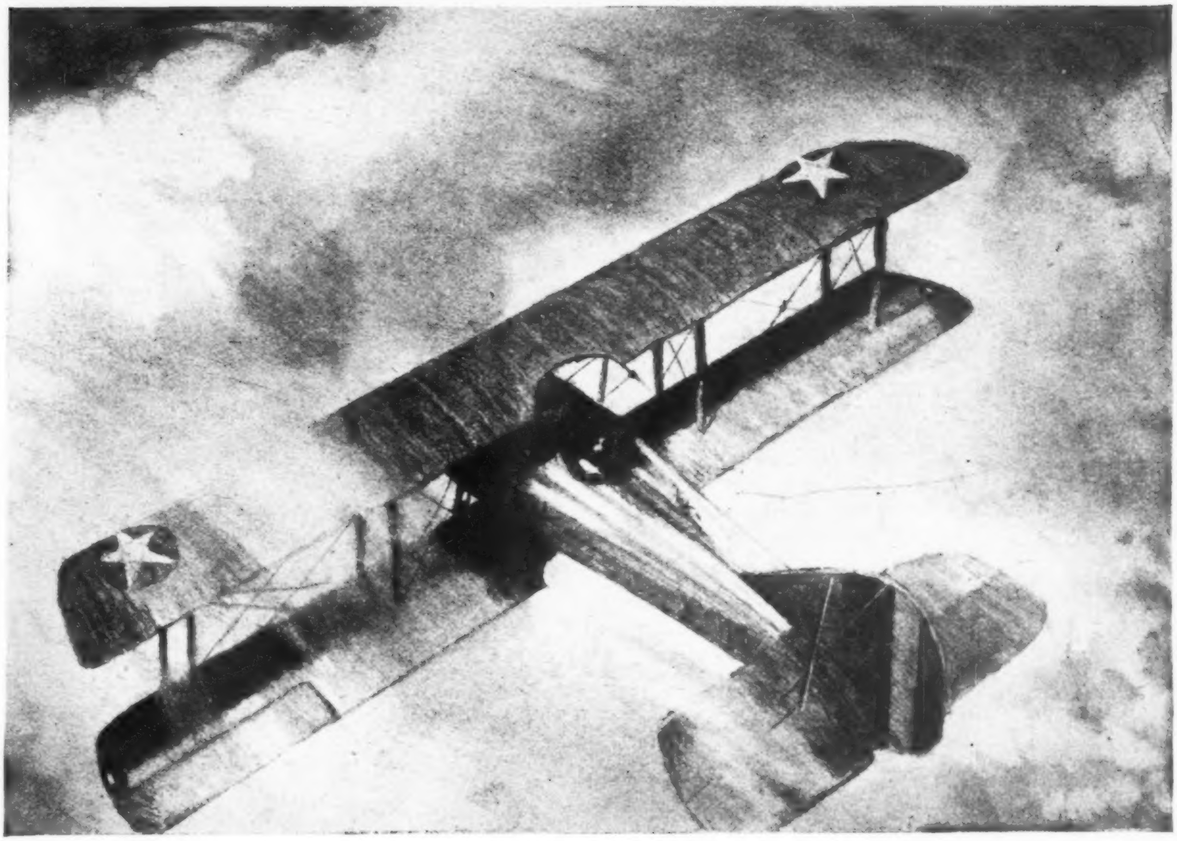
Back in quarters later that evening, tongues waxed free concerning Ian's prowess—and fists waxed nearly as free.

"Trying to tell me what my officer can do?" yelled Nobby Clarke, Ian's mechanic, to another mechanic who claimed to have worked on Lindbergh's plane.

"Say, listen, Sideslip," continued Nobby. "What happens to the average pilot when he loses a wheel, eh? Go on, tell me what happens. I'll tell *you!* He lands and turns over on his back. Bends his propeller and cracks a wing, or something!

"What did my officer do?" he went on. "Why, brought that old Flying Bathtub in like a soap bubble landing on a daisy!" Even grease-monkeys wax poetical at times.

Even in the officers' mess arguments grew loud and long. Few recalled the similar feat accomplished by



An infernally dense morning mist enveloped them for the last hour of the flight to Washington

Clarence Chamberlin, the famous airman who flew in the Bellanca monoplane *Miss Columbia* from New York to Kottbus, Germany.

Those who remembered how Chamberlin had saved two children over Roosevelt Field, New York, were vociferous in their claims that he was Lindbergh's equal as a pilot.

"In fact," said one pilot in the mess, "if anybody asks me, I think there are several on a par with each other. How about Roger Q. Williams—a crackerjack if there is one, or Kingsford-Smith, Jimmy Doolittle, Alford Williams, Frank Hawks, Roscoe Turner, Allan Cobham, Dieudonne Costes, and the rest of that group?

"Where are you going to put fellows like Walter Hinton and Alcock, and Brown, all of whom flew across the Atlantic way back in 1919 in crates that were like old Fords when compared with our present planes?"

Ian butted in to remind the debaters that, after all, this was beside the point, that any one of them actually could have duplicated his feat, and that in any case, such comparisons were odious. However, in bed that night Ian secretly hugged himself with pride to think that he had given rise to such arguments and comparisons.

Two weeks later, we find Ian and his Genii guests of honor at a week-end party at the Long Island home of Commander and Mrs. Stevens. True to their calling, Ian and the Genii had flown to Mitchel Field in a Vought *Corsair*. From Mitchel Field they had motored to the Stevens' home.

Comfortably settled, Ian was playing merry old Harry with the Genii at tennis a few hours later. The score stood 5—2 in Ian's favor and he had the Genii on the run, Ian's forehand drives finding the corners on the base-line with uncanny precision. Commander Stevens was enjoying the game as a spectator, seated, as Mrs. Stevens termed it, on his "throne."

The "throne," as she had told them, was built to the Commander's own specifications — a mandarin's chair fitted into the trunk of a tree which stood near the side-line of the tennis court. This was his favorite chair and no one but himself was allowed to sit in it.

Ian and the Genii stood at the net discussing the set which they had just finished. They were facing Commander Stevens.

"Let's bang a few more balls about," said the Genii. "There's still time before going in to dress for dinner. Anyway, I want some practice at smashing. I haven't been able to smash even a watermelon all afternoon."

Ian agreed but paused to observe quietly:

"FUNNY how agitated the Old Man appears. Notice how he keeps drumming the arm of the chair with his fingers?"

Suddenly they were interrupted by the yapping of two young fox terriers, who scampered in wild pursuit of each other across the court. Ian and the Genii rushed to separate them and prevent a general destruction of tennis balls, which had attracted the dogs on the way. At last quiet was restored.

Ian and the Genii returned to practicing smashing; each lobbing to the other. Suddenly the Genii misjudged a ball and hit at it with all his might. The ball whizzed through the air and smashed into the Commander's lap. He jumped as if hit by a bullet. And rave? One would have thought that he had a pet corn on each toe and that a ton of iron had been dropped on every one.

"Of all the clumsy idiots!" he roared. "Captain Yubanks, what do you mean . . ." He did not finish the sentence, seeming to realize suddenly that he was mak-

ing an exhibition of himself. "Sorry," he muttered, "don't mind me, you two. I must have been dozing."

That awkward incident ended the practicing, however, and Ian and the Genii went to dress for dinner.

"Did you hear a funny noise like a swarm of mosquitoes back there?" Ian spluttered between splashes under the shower. "I could hear them even while the dogs were raising that racket. Must be a swamp around here. Queer, though. I didn't get bitten once, did you, Genii?"

EVEN as he spoke—and it seemed as if the water was acting as an amplifier—there came the sound of more buzzing. The Genii, too, heard it. "That's the queerest thing I've ever heard," he said.

Dinner and the evening as a whole passed tamely and one by one, the guests had gone to bed, Ian and the Genii among them.

Our hero was a long time going to sleep. Many things were on his mind, chief among them that curious buzzing sound, which some inner sense seemed to tell him could not be that of mosquitoes. Sleep came at last but even in his dreams, Ian was attacking squadrons of mosquitoes, whose chief weapon seemed to be a noise like sporadic bursts of machine-gun fire through water.

That dream remained in the back of Ian's mind throughout the next day, and his consternation at what happened that evening can only be imagined.

It was during dinner. The talk, as if predestined, had veered to the subject of the newspaper reports and rumors concerning the agitation in Washington at what the press termed, MYSTERY LOSS STAGGERS CAPITOL! For, be it known, what had first been known only to two or three officials in Washington now had been broached by the newspapers in screaming headlines.

True, the papers did not know what had been lost by the government, but they sensed that it was out of the ordinary by the obvious efforts on the part of the officials to be even more secretive than usual. "I don't know," seemed to be the only answer to every question plied by inquisitive newspaper correspondents to any official anywhere in the national capitol.

"If it is nothing," commented one of the guests at dinner, "why does the government remain so silent? Why not invent some excuse, if only to keep the newspapers quiet? Seems silly to me," he concluded.

"Well," added the wife of a government civil service official in Washington, "you never know. My husband tells me that he has it on good authority that some really valuable papers have been stolen from the government. Something about some mystery plane . . ."

She had been well nicknamed the Chatterbox, but in this instance she wasn't allowed to go further with her chatter.

It seemed to Ian—or were his eyes deceiving him?—that the Old Man shuddered as he heard the words "Mystery plane." Be that as it may, Commander Stevens jumped into the breach with a curt "Pardon me, everybody, but why the dickens we're all sitting here jabbering away about nothing, with a nice, cool veranda calling to the ladies and an equally cool billiard room beckoning to the men, I don't know."

THE ill-disguised hint was taken and the guests left the dining room.

Ian and the Genii did not remain long in the billiard room, the latter reminding Ian that they must be away by daybreak to get back to Mitchel Field in time to start for Washington.

They hastily said their good-byes and went to bed.

Still Ian was troubled. "Wonder what that official's wife meant by her remarks concerning the missing papers and the mystery plane?" he asked himself, and for what seemed an age he could think of nothing else.

However, he nearly fell from bed in the next moment!

Clearly, as if within his ear came that curious buzzing sound again! Startled out of his wits, Ian sat up, electrified.

Good heavens! What a fool he had been! Here it was as clear as daylight. Why hadn't he thought of it before? *WIRELESS!* No wonder no one complained of mosquito bites! There were no mosquitoes. It was wireless and nothing else but—!

Ian jumped from bed, reached in his coat pocket and took out paper and pencil. He listened.

x x .— ..— .——./ .—..—

A U P E X

.—. — ——.—/ .—— —.

R T Q W N

——.— —... —.—./

Q B C

So it went on. Finally he recognized the ending signature *VEVEVE*. He stared wild-eyed at the seemingly idiotic array of letters he had taken down. This is what he saw:

..AUP EXRTQ WNQCB ARWNZ ROHGF EPQYD AAA
SWRTM EQZPU NRTBD DOGFH PCSLK LHGTM
APQZW NRGOA SZTQR KLAWGOB VEVEVE

For fully five minutes Ian stared stupidly at the wireless message he had unwittingly picked up. Then he read it through again and again. His training in military wireless made him realize that this was no amateur wireless enthusiast at work. True, there were none of the usual military or naval official prefixes to the message, yet those who were sending or receiving

"We'd better follow the shipping lane", said Ian as they discussed their plans

such signals obviously were unusual persons by reason of their apparent knowledge of the five-letter-group code.

Try as he would, however, Ian could not decode the message. He used every code key he could remember, but to no avail. So engrossed was he in what he was doing that before he realized it, the time was nearly two o'clock in the morning. His last conscious action was to write out the message again, arranging in groups of five the words he had taken down to see if that would lead to any clue to the key. Through sleep-weary eyes he read:

...AUP EXTRQ WNQBC ARIWNZ ROHGF EPQYD AAA SWRTM EQZPU NRTBD DOGFH PCSLK LHGTM APQZW NRGOA SZTQR KLAWGOB VEVEVE

Again—failure. "'S funny I've taken such an interest in this," said Ian to himself. "What's it all about, anyway? Possibly some half-wit at one of the stations doing a little practicing and causing similar interest in others, I suppose.

"Still, it is funny, at that. Come to think of it, either I am crazy or else the world's suddenly gone cuckoo. Here have I, without earphones or a wireless set anywhere within sight, taken down a wireless message, which, while apparently crazy, is nevertheless a perfect grouping of letters. Only how to decode it?

"What's wrong? Or did dinner disagree with me?" Even as he mumbled the words Ian, fagged out by the day's happenings and brain-weary of trying to solve the mystery, crawled into bed.

After what appeared to Ian to be only two seconds, there came a loud knock on his bedroom door and in stalked the Genii fully dressed.

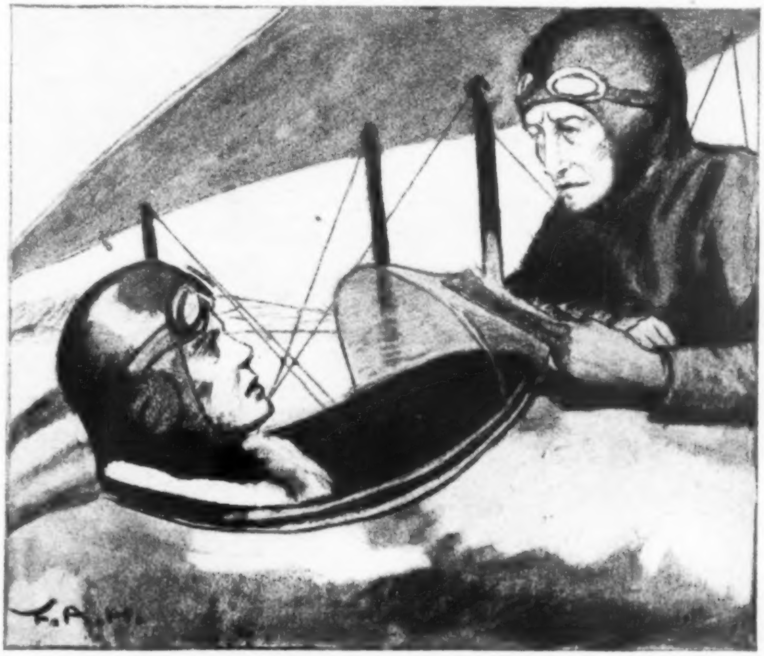
"Come on, young fellow, show a leg! Think you're here for a week?" joshed the Genii. He switched on the light, then, "Good heavens, lad, what are you doing sleeping with a piece of paper in your hand?" he asked.

"Yeo-o-o-o," yawned Ian. "Oh, shurrup 'n leave me alone. Uh? Whassat, paper? Oh, yes. Sssh, Genii, sssh." Ian was fully awake now and bent forward.

"Genii," he whispered, "I think I've got something important here but I'm not sure. Wait till we reach Mitchel Field, then I'll explain."

The Genii nodded and sat down to wait for Ian.

Soon they were both giving a perfect demonstration of what two hungry airmen can do to a palatable breakfast at dawn served by a taciturn butler. Neither noticed the quickened interest in the servant's eyes as, toward the end of the meal, Ian could no longer restrain himself and whispered, "Wireless message" to the Genii as his hand unconsciously felt in his pocket for the perplexing slip of paper he had treasured all night.



The Genii took the paper and read it intently. He was seriously impressed

Neither said much on the way to Mitchel Field and once there, both confined themselves to giving their plane a thorough inspection. This inspection is a fetish with all good flyers. Much as they might trust and like their mechanics, it is a case of "Everything is okay, sir" meaning nothing in the flyer's scheme of things.

Every turnbuckle, landing and flying wire, gas and oil gauges and every nut, bolt and screw visible were tested and they then reported to the Operations Office for clearance papers. Back at the plane, the Genii sat in the cockpit, waggled the "joystick", control lever, to see that all controls were working properly, and then started the engine.

Gently he fed it gas to warm up the engine in the strictly prescribed manner, and as the throttle was moved slowly forward, the tachometer showed the varying revolutions per minute —400, 700, 800, 1,000, 1,200, 1,350, 1,500, 1,650. The Genii kept the engine running at 1,650 for three or four minutes and then slowly pulled back the throttle until the propeller was gently ticking over.

He then gave the mechanic the signal that everything was all right and that the man could leave. Turning to Ian, the Genii said,

"Well, out with it, old boy. What's this thing you wanted to show me?"

Ian pulled from his pocket the piece of paper on which was written the mysterious wireless message.

"Before I show you this," he said, "let me explain something. You remember that stuff the Chatterbox pulled off during dinner about the government losing some valuable papers and a mystery plane?

"Well, perhaps the thing became rooted in my mind or something, but anyway when I went to my room, I didn't feel like sleeping. Her talk about the mystery plane kept running through my mind.

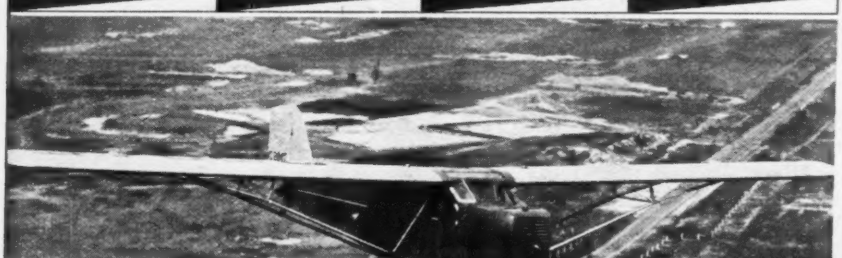
"THEN, just as I was about to give it up, so to speak, there came that irritating buzzing sound we both had noticed. Like a flash, the truth dawned on me and I listened intently. Sure enough, it was Morse code, so I took down the message.

"But tell me, Genii, how in the blazes could I have received this without a wireless set? I mean—here is a message as plain as daylight. I didn't sit down and write this stuff out for the fun of it, and what's more, I have the strangest kind of feeling that it is something important and that I'm going to play a part in whatever it is."

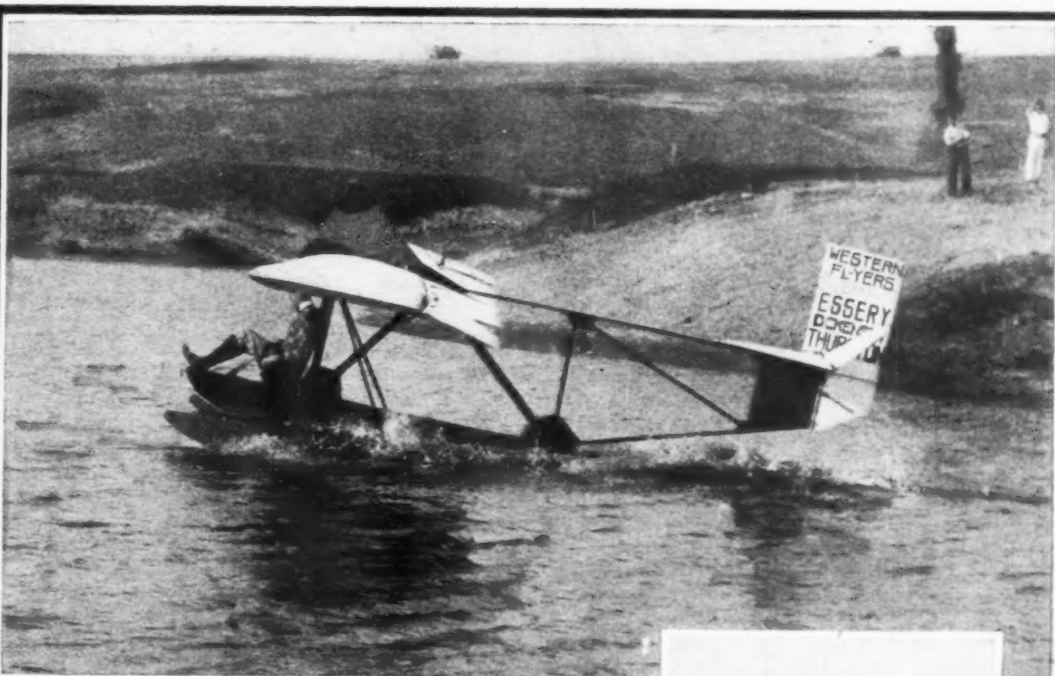
The Genii nodded, took the paper and read it intently. He was seriously impressed.

"Tell you what, old son," he said, glancing around the field, "we'd better get going. (*Continued on page* 46)

ABOVE, a majestic formation of army fighting planes flying over Oakland, Cal. With one hundred and thirty army machines of all types, they participated in maneuvers held recently by the U. S. Army Air Corps at Mather Field, Sacramento, the largest gathering of army planes assembled on the Pacific Coast
P & A



A GIANT flying boat of the NYRBA airplanes (above) over southern Cuba, completing the first seven days service to the United States from Buenos Aires. Left, a head-on view of the Curtiss "Robin," sister ship of the famous St. Louis "Robin" which remained in the air for more than 420 hours on a refueling endurance flight



Science & Invention

Note the position of the ship and that the elevators are way up as the ship stalls. This is a view of Mr. William Van Dusen's amphibian glider. Shown below is a glider making a gentle left turn. By use of left rudder and movement of the stick to the left, the ship has been tilted into this bank. Note the angle of glide which insures the pilot against the danger of stalling

A Manual of Motorless Flight

By

PERCIVAL WHITE

and MAT WHITE

GLIDING and SOARING

This is the seventh instalment of this absorbing series on Gliders and Gliding.

Percival White is well known as a writer. He has brought out many books on technical and semi-technical subjects, (such as "How to Fly an Airplane", published by Harper and Brothers). Mat White, the co-author, has collaborated with Percival White in the writing of some of his previous works on aerial subjects.

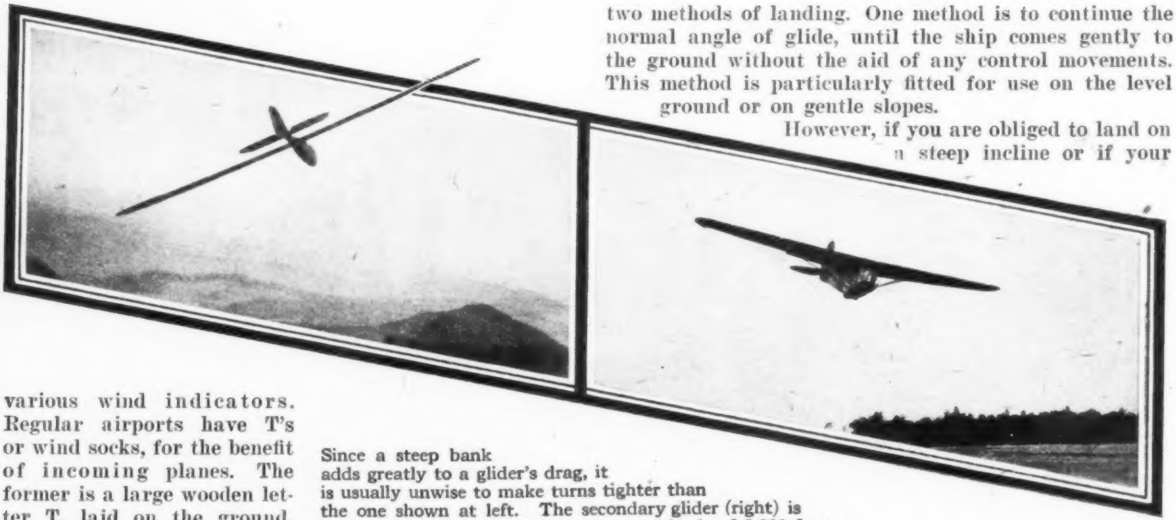
LANDING is the act of grounding the glider. A glider drops to the earth when it loses flying speed, *i. e.*, when it stalls. In order that the ship may not be damaged by landing, the stall should be brought about when the plane is flying very close to the ground.

You must acquire a good deal of skill before you will be able to execute landings with precision. A poor landing is apt to injure the glider, but the pilot himself is rarely hurt by the impact of the plane on the ground, since a glider is light, contains no combustible fuel, and has a low stalling speed.

Wind Direction. Always aim to land directly into the wind. The glider pilot's object is to maintain air speed as long as possible, and at the same time, to land with the lowest possible ground speed. As in a take-off, when you are flying straight into the wind, air speed is greater than ground speed by an amount equivalent to the velocity of the wind.

During your first few glides, you will not need to consider wind direction before landing; you will make no turns from your original course, and the wind will not have time to change measurably. As your flights become more extended, however, you must watch for wind direction indicators as you near the ground.

It is well at this time to familiarize yourself with the



Since a steep bank adds greatly to a glider's drag, it is usually unwise to make turns tighter than the one shown at left. The secondary glider (right) is shown after release from a tow to an altitude of 5,000 feet

various wind indicators. Regular airports have T's or wind socks, for the benefit of incoming planes. The former is a large wooden letter T, laid on the ground, with the stem of the T pointing in the direction in which the wind blows. A wind sock is a tapered cloth tunnel, usually about three to five feet in length, through which the wind blows. One end of the tunnel is fastened to a pole and the sock blows out with the wind, somewhat like a flag. (See Figure 1.)

However, since gliders are not apt to land near a flying field, you must learn to rely on leaves and grass, smoke from stationary stacks, clothes on a line, ripples in water, etc., as wind indicators. Do not take the feeling of the air against your face as an indicator of wind direction; it tells you nothing but your angle of yaw.

If you find, when you are already near the ground, that you are not flying straight into the wind, it is usually best not to attempt to change your course. A turn at very low altitude might be dangerous. Unless the wind is extraordinarily high, you can land in a cross wind.

Cross-wind landings are described in a later paragraph. If you are landing in a tail wind, keep the stick well back. If the wind should get under the rear edges of the elevators or wings, there is a possibility of the ship's "nosing over." Of course, you should normally not land with the wind, because this makes your landing speed unduly high.

Choosing the Place for the Landing. As long as your glides are short and you gain little height, you will not have much choice of landing place, once you are in the air. That is why it is essential that you have a long open stretch ahead when you take off.

When you are able to look about for a landing place from a greater altitude, and when you have time to change your course before reaching the ground, you will have a wider choice. Then you must select the best and most level spot available.

Occasionally, gliders are forced to land on the water. In this event, the thing to do is to unbuckle one's belt and to swim in, towing one's craft. The plane will float until it is water-logged. Such catastrophes happen, as a rule, close to the shore.

Steps in Making a Landing.

1. *Levelling off.* There are two methods of landing. One method is to continue the normal angle of glide, until the ship comes gently to the ground without the aid of any control movements. This method is particularly fitted for use on the level ground or on gentle slopes.

However, if you are obliged to land on a steep incline or if your glider has wheels, there is some danger of nosing over if you land with the tail in the air. In this event, you must land in another way. This way is discussed at greater length here, not because it is more important, but because it is more difficult. The proper one to employ depends on the type of ship used.

In order to land by this method, bring the stick back gradually to neutral, just before reaching the ground so that the ship's position changes from an angle of glide to a horizontal position. (This method is comparable to the three-point landing of a motored plane.) If the angle of glide has not been too sharp, the plane will level off easily with this slight backward movement of the stick.

2. *Stalling.* When the glider is in a level position, hold the stick stationary. The ship will continue forward but will lose speed, settling to the ground at the same time. When its speed has become so slight that it no longer sustains itself in the air, it will stall of itself and settle. Settling can be hastened by gently easing the stick back. An experienced pilot may pull it way back with some firmness.

WHEN the ship has stalled, it will drop directly to the ground. The aim of the motor airplane pilot in effecting a three-point landing is to have both wheels and tail-skid touch the ground simultaneously. If the glider has been brought exactly to a stalled position, it, too, will make the equivalent of a three-point landing.

As you reach the earth, do not put your feet on the ground to stop the glider; your feet might be caught under the fuselage and be crushed.

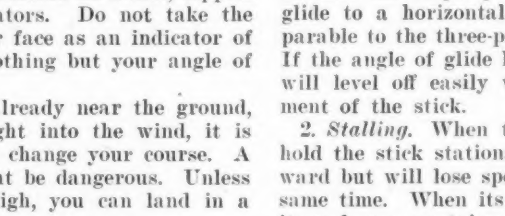


Fig. 2
A GLIDER ONCE BANKED TENDS TO BANK ITSELF FURTHER
The arc traversed by the outer wing is greatest therefore the outer wing travels faster and has more lift

It is very important also always to keep your feet on the rudder-bar so that you can keep the glider headed straight.

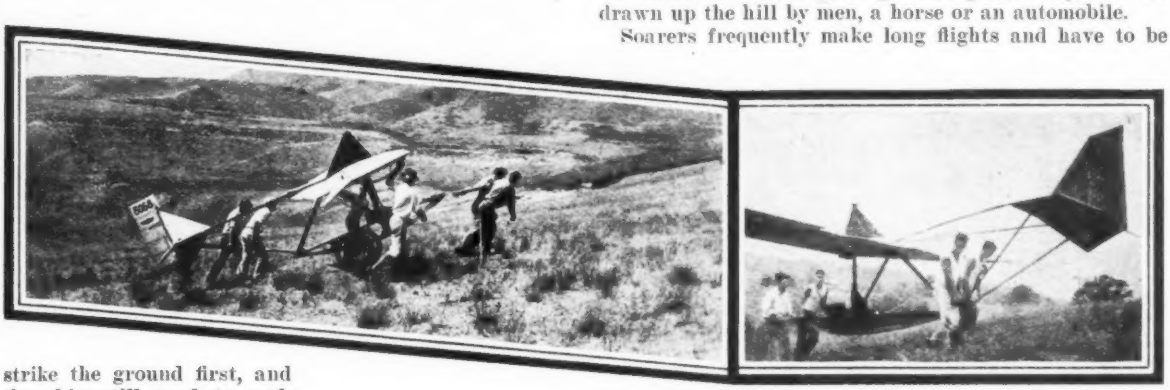
You must take care to maintain lateral balance throughout the landing. When the glider has come to a full stop, however, it usually cannot remain balanced on its single skid, and one wing will drop slowly to the ground. But in a ten to fifteen mile wind a good pilot is able to hold up this wing indefinitely.

Faulty Landings. To make

a perfect landing requires a great deal of practice. Although faulty landings do not usually have serious consequences, you must learn to avoid them.

The most serious mistake beginners make is to level off too soon, with the result that the stalled ship drops from too great a height. This is called a "pancake landing." The consequent shock may wreck the glider. Do not get ready to land prematurely. The ground will impress itself upon your consciousness as it seemingly rises to meet you.

If you neglect to pull the stick back when landing on a steep slope, the forward part of the fuselage will strike the ground first, and the ship will tend to rock forward onto the nose.



By seeing that the weight of the glider is borne by the wheels of the "cradle," much less exertion is required to transport the glider uphill. At right is shown another method of carrying a glider uphill

If you pull the stick back too far, the glider will stall too soon. If you pull the stick back too soon and too far, while you still have considerable forward speed, the glider, instead of stalling, will start to climb again.

Unless the stick is then immediately pushed way forward, the glider will then stall and drop, probably damaging it.

Some time you may fly farther than you expected, and realize that you will not be able to complete your landing before overtaking an obstacle. In this case, push the stick well to one side, until the wing tip drags on the ground, and swings you around. Do not do this unless it is absolutely necessary, since it will probably damage the wing.

Spot Landings. A "spot landing" is an attempt to ground the glider at a point marked out on the ground. The practice of spot landings adds to the pilot's skill. You may at some time be forced to land in a very small place. Spot landings are easier in gliders than in airplanes; a glider pilot is able to see the place marked for the landing until the instant he grounds the plane. Therefore, spot landings in gliders can be made with great accuracy.

Cross-Wind Landings. One danger of a cross-wind landing is that the wind will be carrying the ship crosswise while it is landing straight ahead, and as it touches the ground, will wipe off the landing gear. In order to land the plane in a cross wind then, the best plan is usually to side-slip into the wind.

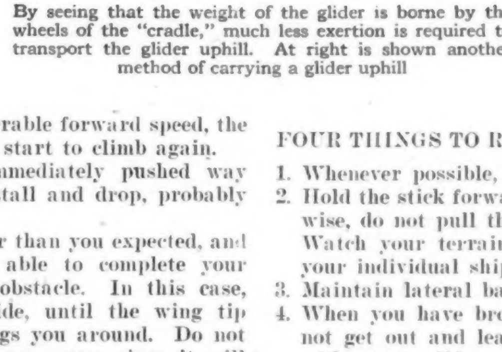


Fig. 5
A SLIP

For example, if the wind is coming from the right, back the plane a little, so that the right wing is lower than the left, without any corresponding rudder movement. This will prevent the wind from catching under the right wing-tip. Dive the ship a little at the same time to prevent stalling. Just before you reach the ground, right the ship. This method of cross-wind landing should remove the danger that the landing gear be side-switched in landing.

Returning the Glider to the Taking-Off Place. Gliding is something like coasting: You have to spend most of your time toiling up hill. If the glider has to be carried a short distance only, it can be lifted by a man at each wing tip, and one at the nose and the tail.

A more convenient method is to have a pair of wheels, on which to set the fuselage. The glider may then be drawn up the hill by men, a horse or an automobile.

Soarers frequently make long flights and have to be carried long distances. For this reason they are usually built so that they may be taken apart easily and fitted in a truck or trailer.

FOUR THINGS TO REMEMBER ABOUT LANDINGS

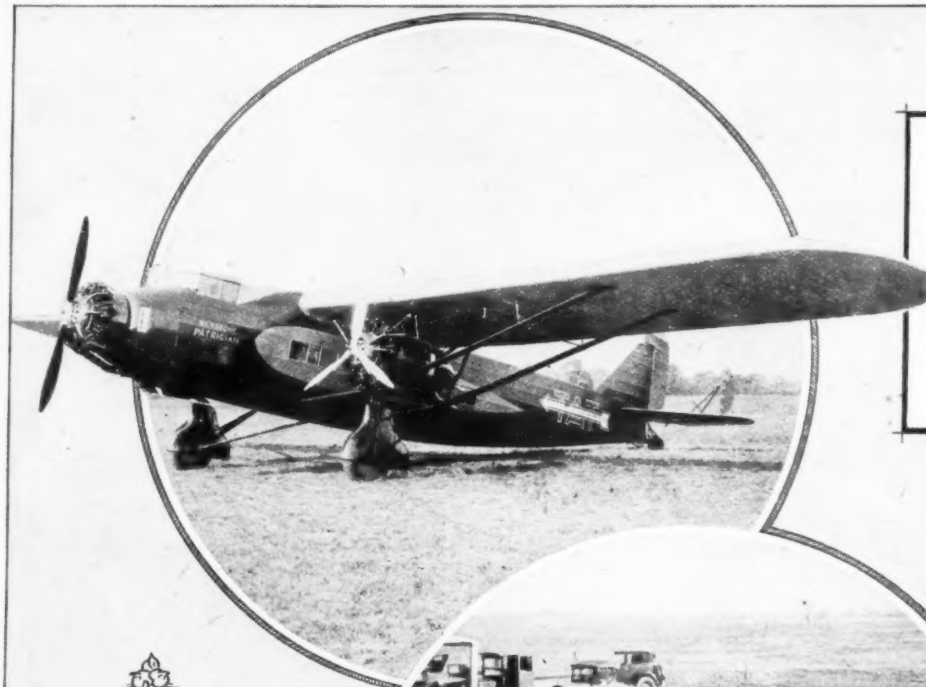
1. Whenever possible, land into the wind.
2. Hold the stick forward if the terrain permits. Otherwise, do not pull the stick back too far or too soon. Watch your terrain and learn the requirements of your individual ship.
3. Maintain lateral balance throughout the landing.
4. When you have brought the ship to the ground, do not get out and leave it. The wind works mischief with empty gliders.
5. Until you are within a foot of the ground, keep flying speed.

CAUTIONS TO POWER-PLANE PILOTS

1. If you fear that the landing will be a poor one, make the best of the situation. You can't "give her the gun and go around again."
2. Do not level off at too great a height. The glider loses less altitude between the levelling off and the stall than does the airplane.
3. Do not worry if you must land in front of an obstacle. A glider does not roll ahead after it is grounded.

TURNS

A turn is a deflection to the left or right from the directional course of the glider. As soon as you are able to make straight glides of nearly thirty seconds' duration, you should begin to practice turns. A turn is one of the most difficult of the elementary maneuvers, since it requires (*Cont'd on page 36*)



TO the left, an excellent close-up showing the striking features of a tri-motored, passenger carrying Keystone "Patrician"

AMERICA'S outstanding light plane (right), the Barling NB-3, holder of many American altitude and distance records

A THREE-quarters rear view of a Loening Amphibian, giving a clear impression of its neat lines

See Plans on Pages 14 to 19

By ROBERT MORRISON

HOW TO BUILD
A Scale Model of the Stinson "Junior"

A 2 ft. 4 in. Replica of this Popular Monoplane

THE Stinson *Junior* is one of the most popular four-seat enclosed monoplanes of today.

The Stinson Aircraft Corporation, builder of this plane, was founded by Mr. E. A. Stinson, one of the oldest and most experienced pilots in the United States. He first flew in 1911, on the early Wright machines, and since then he has earned the distinction of having taught more men to fly than any other instructor, as well as having served as a test pilot for ten years.

FUSELAGE

To make the fuselage, cut or saw it to shape of balsa wood, 18" x 3" x 2 1/4". First trace the side view of the fuselage and cut as shown in Number 1. Then trace the top view and also cut carefully, as shown in Number 3.

Be sure to get the nosing perfectly round up to the windshield. Then, using rough sandpaper, curve all the edges of the fuselage from the cabin down to the tail. After that is done, go over the whole thing with fine sandpaper so it will be ready for painting.

Hollow out the cabin with a small sharp chisel or knife. Install instrument board, three seats and dual controls, which are all made of balsa, and paint the interior gray. Let the cabin dry thoroughly.

WING

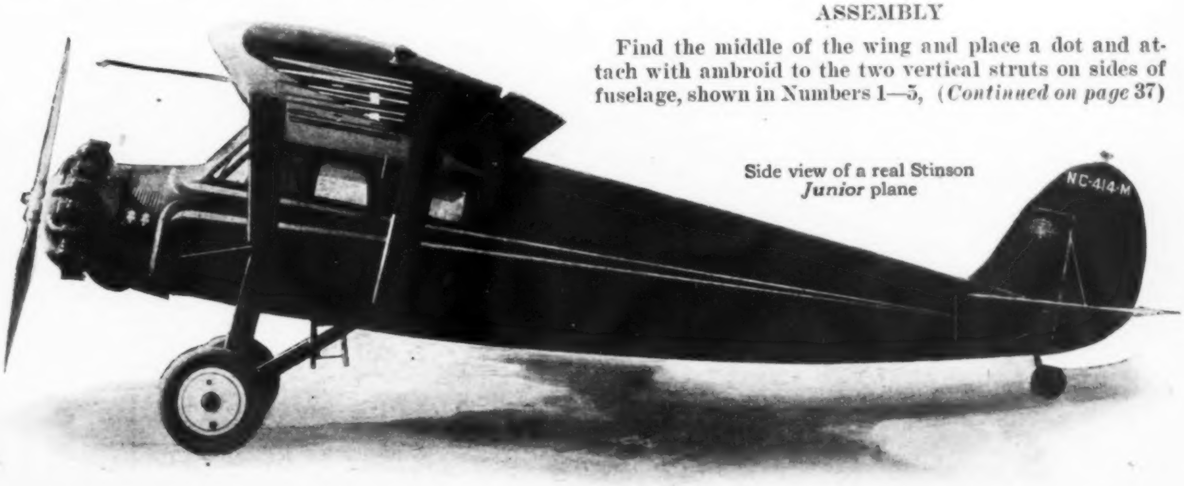
Use a piece of 28" x 4 1/4" x 3/4" balsa. To obtain the shape of the wing, use a sharp knife and coarse and fine sandpaper wrapped around a block of wood. (Number 4.) Then cut a place in leading edge for skylight. When finished, place a light made of balsa at each wing tip. (Number 5.) Then draw with lead pencil ailerons (Number 5) and press heavily so as to make grooves.

TAIL UNITS

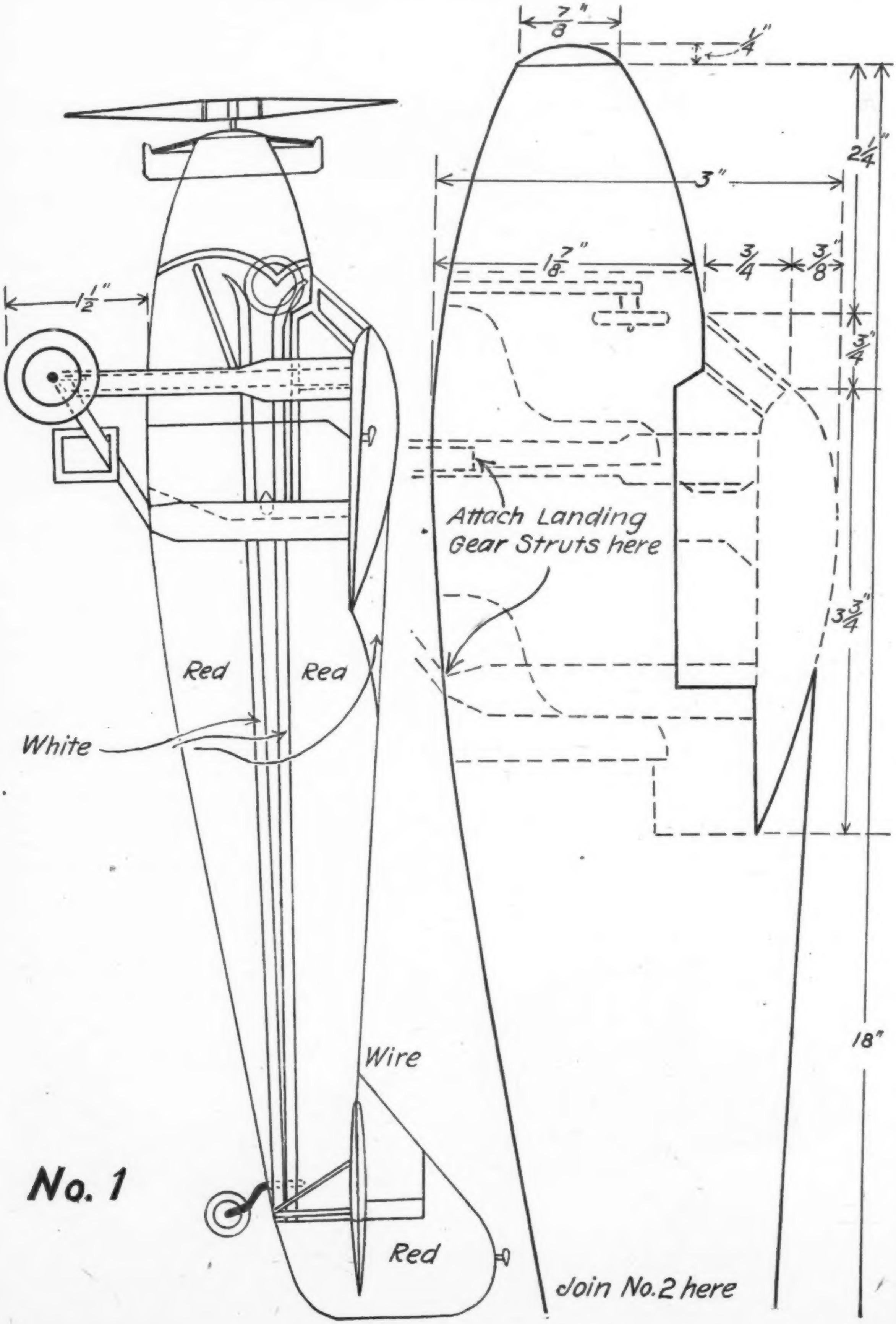
To make the rudder and elevators, use 1/4" thick balsa wood. For measurements, see Number 2. Draw line heavily on both sides to separate rudder from fin and elevators from stabilizer. Attach a light slightly smaller than that of the ones on the wing to the top of the rudder. (Numbers 1—3.) A razor blade is preferable to cut the tail units to shape.

ASSEMBLY

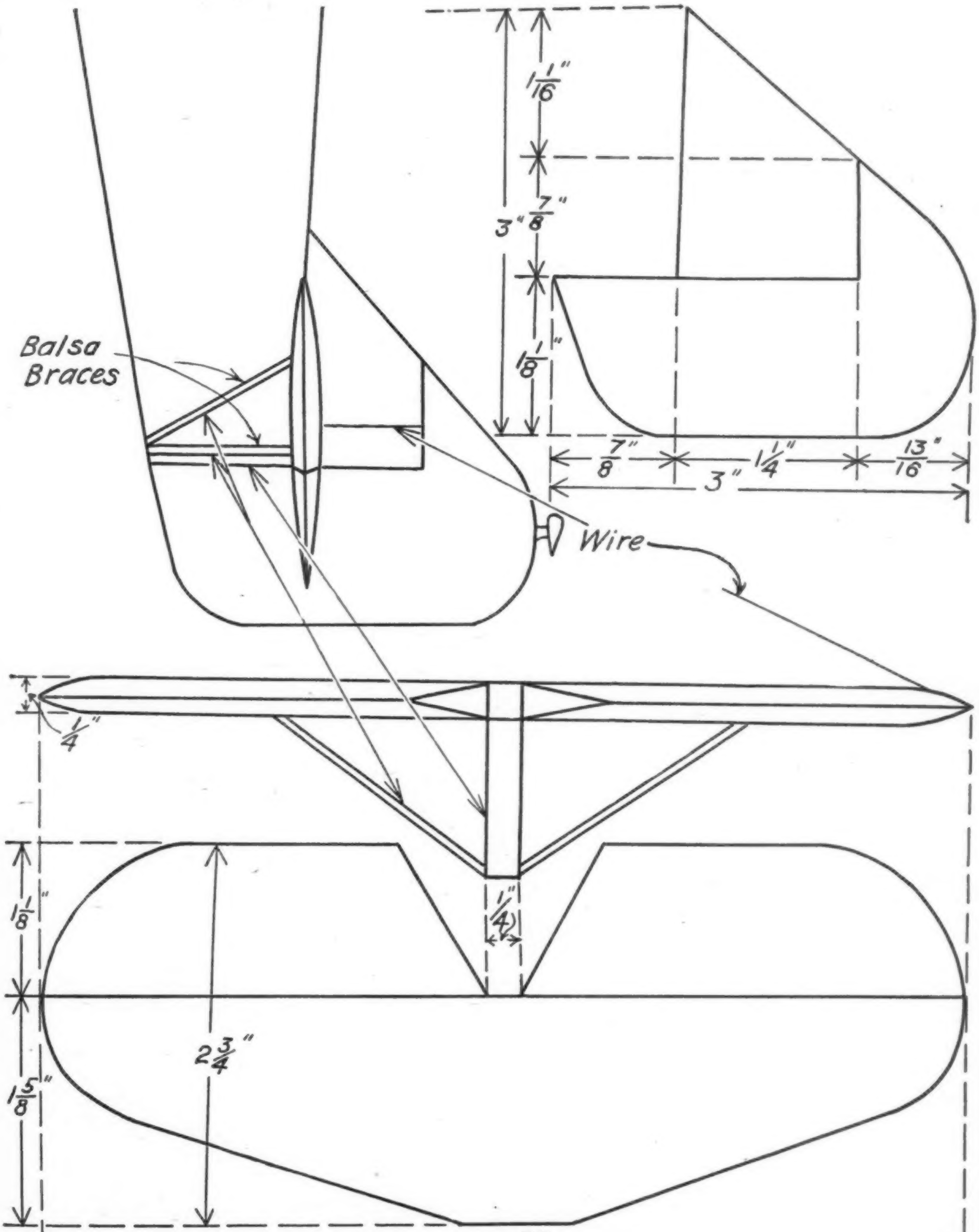
Find the middle of the wing and place a dot and attach with ambroid to the two vertical struts on sides of fuselage, shown in Numbers 1—5, (*Continued on page* 37)



Side view of a real Stinson *Junior* plane

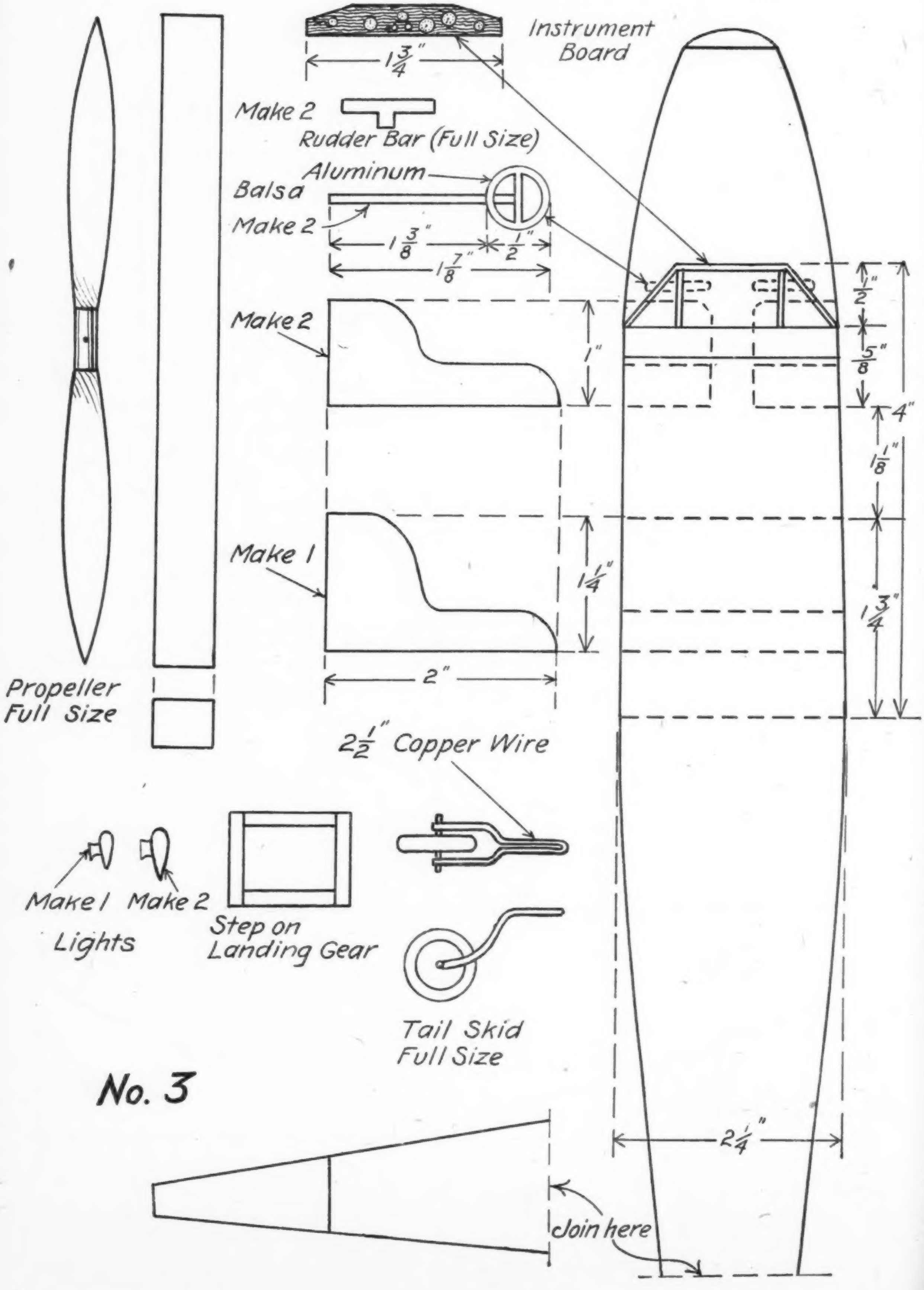

7/8"
1/4"
2 1/4"
3"
1 7/8"
3/4
3/8"
3/4"
1 1/2"
Attach Landing
Gear Struts here
3 3/4"
Red
Rea
White
18"
Wire
Red
Join No.2 here

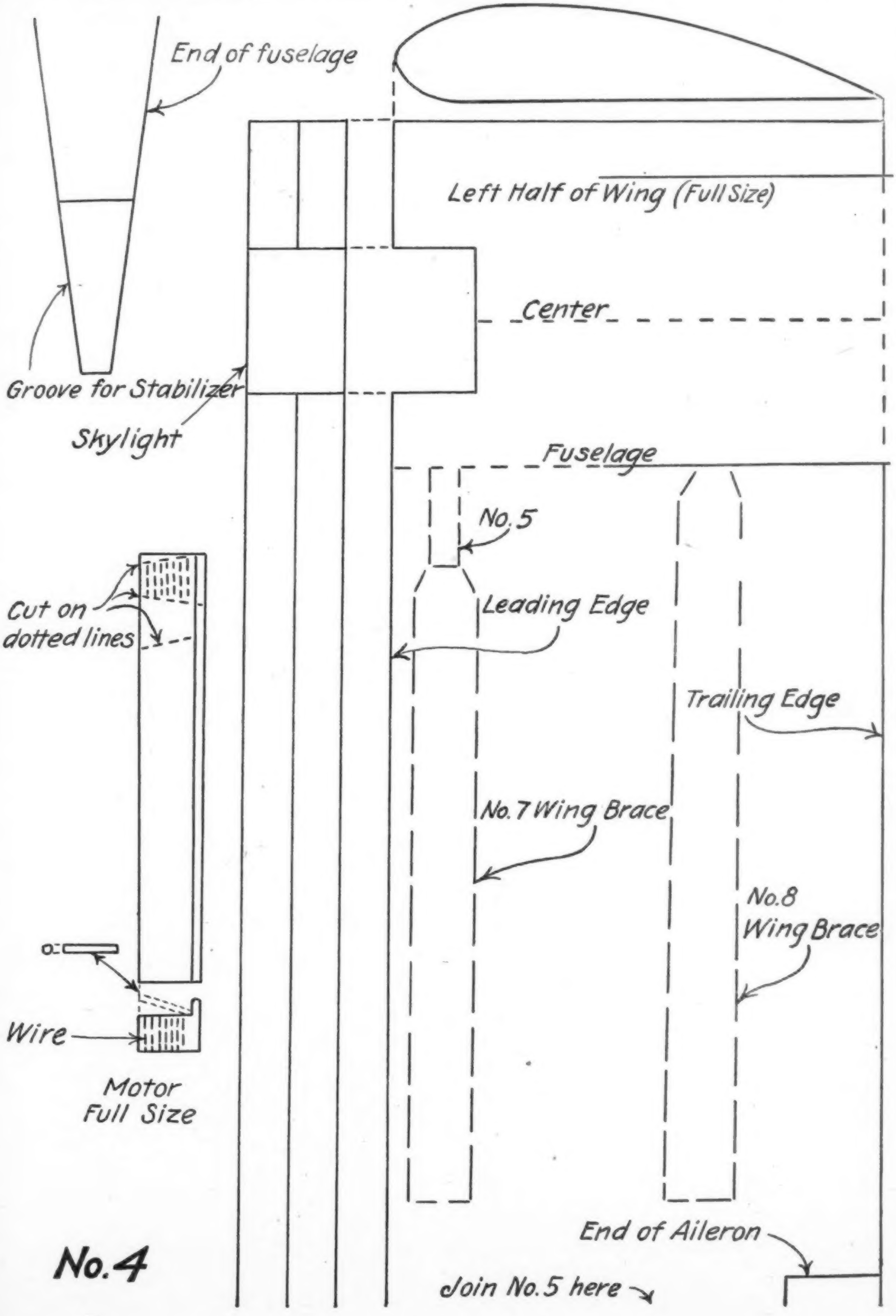
No. 1

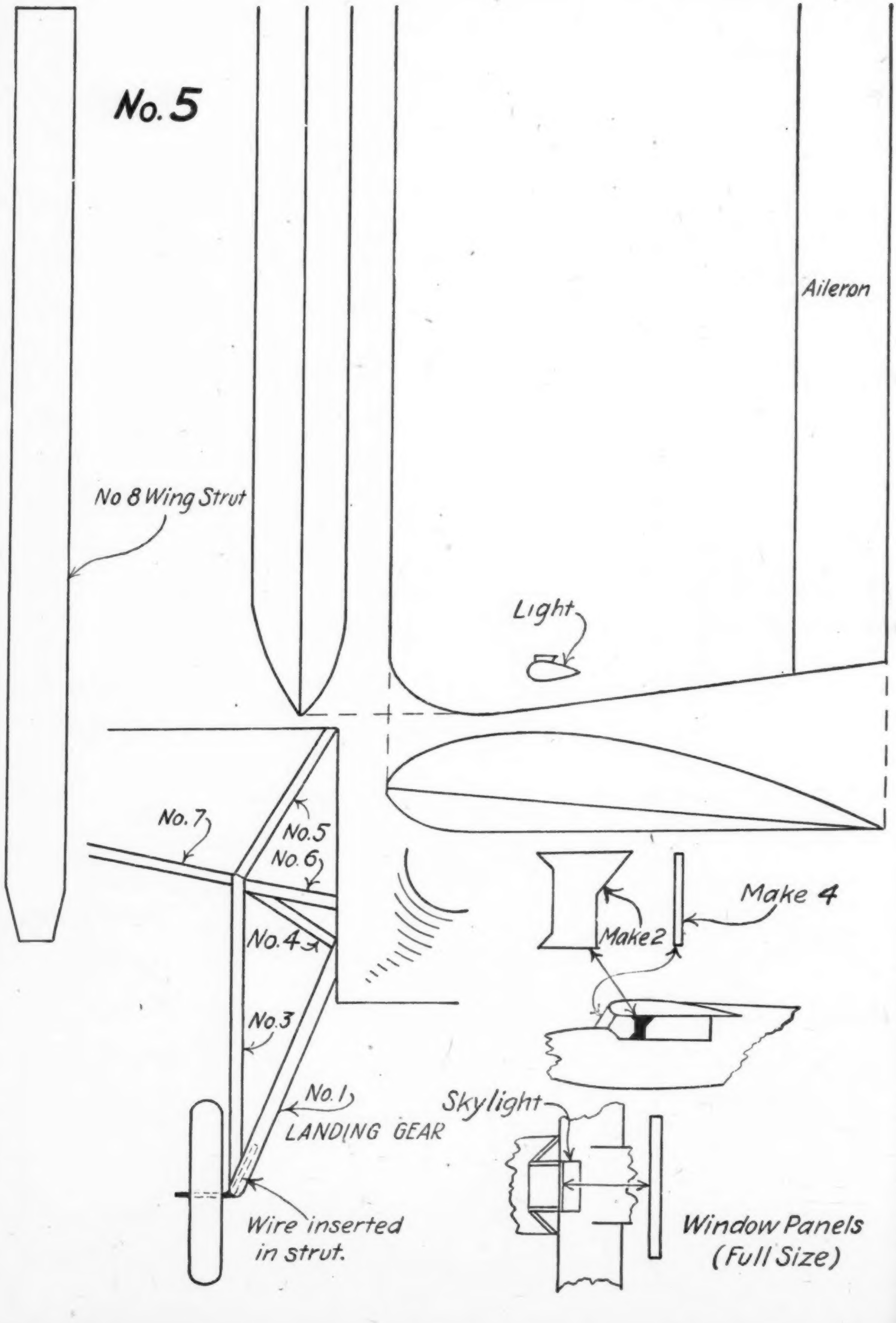


No. 2

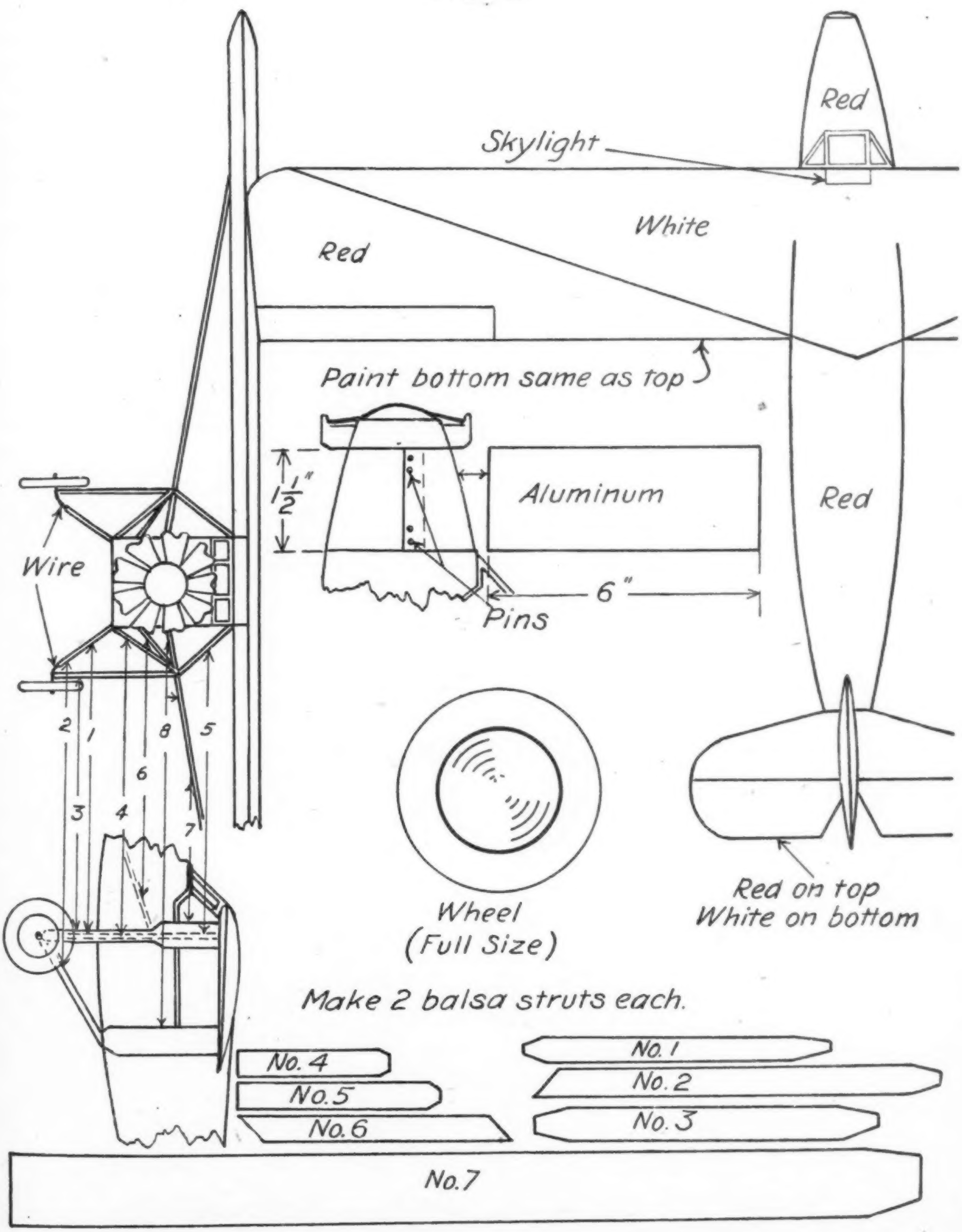
RUDDER AND ELEVATOR (Full Size)


Instrument Board
1 3/4"
Make 2
Rudder Bar (Full Size)
Aluminum
Balsa
Make 2
1 3/8"
1/2"
1 7/8"
1/2"
5/8"
4"
Make 2
1"
1 1/8"
Make 1
1 1/4"
1 3/4"
2"
Propeller Full Size
2 1/2" Copper Wire
Make 1
Make 2
Lights
Step on Landing Gear
Tail Skid Full Size
No. 3
2 1/4"
Join here


End of fuselage
Groove for Stabilizer
Skylight
Left Half of Wing (Full Size)
Center
Fuselage
No. 5
Leading Edge
Trailing Edge
No. 7 Wing Brace
No. 8
Wing Brace
Cut on
dotted lines
Wire
Motor
Full Size
End of Aileron
Join No. 5 here
No. 4

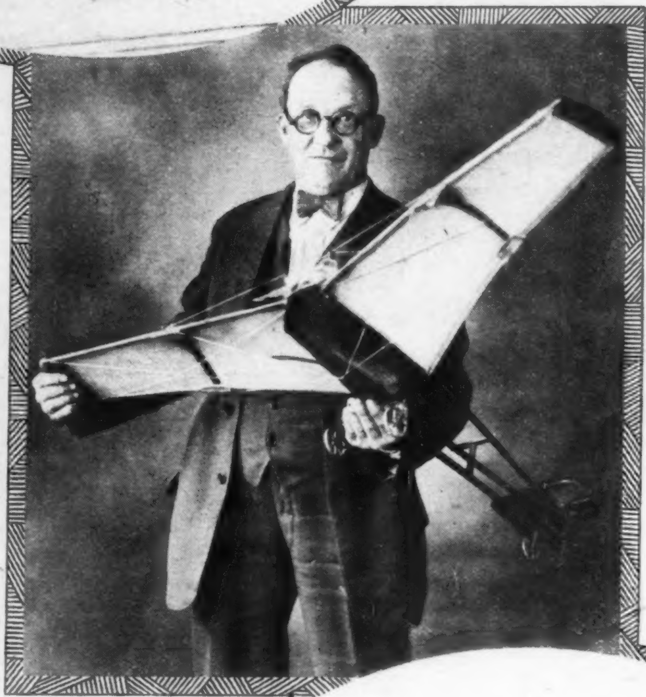

No. 5
Aileron
No 8 Wing Strut
Light
No. 7
No. 5
No. 6
No. 4
No. 3
No. 1
LANDING GEAR
Wire inserted in strut.
Make 4
Make 2
Skylight
Window Panels (Full Size)

No. 6



Red
Skylight
White
Red
Paint bottom same as top
$1\frac{1}{2}$"
Aluminum
Red
Wire
Pins
6"
2
1
8
5
6
3
4
7
Wheel
(Full Size)
Red on top
White on bottom
Make 2 balsa struts each.
No. 4
No. 5
No. 6
No. 1
No. 2
No. 3
No. 7

DIFFERING radically from other aircraft is the Autogiro (left above) with its revolving blades over the cockpit, which enable it to fly at a very slow speed. Capt. Rawson is shown at the controls and Sir Sefton Brancker, famous English figure in the late war, at the front of the craft just before a test flight taken from the Heston Aerodrome, England
P & A



LOUIS KROMM, harness maker of Baltimore, Md., (center) claims the distinction of having built the first flying model airplane. This was constructed in 1900 along the lines of a buzzard
P & A

WITH the record recently made by Col. Charles Lindbergh on his transcontinental flight in less than $14\frac{1}{2}$ hours adding to his trans-Atlantic achievement in 1927, it is fitting to hearken back to the first plane ever built for trans-Atlantic flight, the America 1st (right). This was a Curtiss hydroairplane equipped with twin motors. After a successful test flight at Keuka Lake, N. Y., in July 1914, it was declared ready for a trans-Atlantic hop, but the intervention of the World War caused a postponement. The ship and flight were financed by the late Rodman Wanamaker
P & A

When navigation is needed most—flying over water

Special Course in Air Navigation

The Mainstay of Successful Piloting

By Captain LESLIE S. POTTER

IN this series of articles, the author has endeavored to set out as clearly as possible, and in as simple words as possible, the art of navigation in the air.

Your interest in these will depend on your interest in flying, and whether you will consider yourself a pilot when you have learned to take a plane off the ground and bring it down again without breaking anything.

To those who do, these articles will be valueless, but to those who aspire to be more than fair weather pilots, to be able to fly from place to place without sole recourse to roads and railways, to be able to fly above the clouds with safety if they are too low to admit of safe flying beneath them, an intelligent interest in these articles will be of incalculable value.

Air navigation is not a complicated subject, an intense knowledge of mathematics and trigonometry is not necessary, merely the average person's powers of common-sense reasoning. The whys and wherefores of all the facts will only be given where they are necessary to understand the facts.

If some of the points seem too elementary do not pass them by, there is a reason for their inclusion; if some points do not seem clear, be patient, you will generally find some information further on, that will clear them up as you proceed. Answer the questions at the end of each article and wait for their solutions in the next issue, and should you find any points requiring further explanation, send a letter with a stamped addressed envelope to the editor setting out your problems and a reply will be sent you explaining the points raised.

THE EDITOR.

THE TRIANGLE OF VELOCITIES—sounds an alarming title, but it is the only one thought of, so far, that completely describes the subject.

First of all, you must get the correct meaning of "velocity". Velocity is not merely the speed of a projectile or body, but the rate of change of its position. Therefore, the velocity of a body involves both its speed and direction.

Most of you will know from school, the fundamental that, given two sides of a triangle, you can always find the third, and so it is with the triangle of velocities. The components that make up the three sides are as follows:

1. The track or the course you have to make good, that is to say, the bearing of one place from another on a map and its distance, or, alternatively, your groundspeed.
2. The windspeed and direction.
3. Your course as shown by your compass, and your airspeed as ascertained from your indicator.

Given any two of these, you can always discover the third, and two of these components are always known to you. You will always know your course and airspeed from your instruments and you can always find out your track and distance from a map. The known factors will, of course, differ with changing circumstances, and these we will deal with as we go along.

We will first try to get the principle of it clear in our minds because we are now getting to the stage in this series of articles when we are going to try the

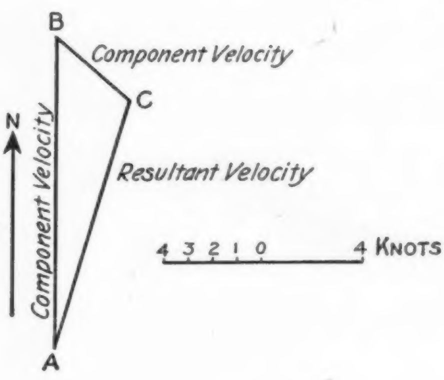


Fig. I
RESULTANT VELOCITY

practical application of some of the facts we have been studying.

Now a body may be subject to two or more velocities at the same time, which may or may not act in the same line. When two or more velocities are acting at the same time, they are called component velocities and the net result of the effect of these two forces is called the resultant velocity.

With an airplane flying at 80 m.p.h. and a wind directly behind it of 10 m.p.h., its actual speed will be 90 m.p.h. The two component velocities in this case would be the plane's own velocity of 80 m.p.h. and the wind's at 10 m.p.h. The resultant velocity is 90 m.p.h. If a wind of the same speed were directly ahead the resultant velocity would be 70 m.p.h.

YOU can see, then, that when two velocities act in the same straight line, the resultant velocity is obtained by addition or subtraction. It is when they do not act in the same line, however, that we have to start drawing our triangles of velocities.

Suppose a ship were steaming north at a speed of 12 knots per hour and the tide is running at 4 knots 130 degrees, and it is desired to know the resultant velocity. In Figure I, A represents the ship's position and AB, being 12 knots (the ship's speed) drawn to scale, represents the velocity of the ship in one hour. BC is a line, 4 knots drawn to scale, representing the direction and speed of the tide in one hour.

Here you have two sides of your triangle. Complete it by drawing a line between points A and C and this will indicate the speed (to scale) and the direction of the resultant velocity, in this case 17 degrees at 10 knots. If you consider for a moment that each of the components acted separately for an hour, then the ship, being influenced only by the power of its engines, would arrive at point B after an hour. Then with its engines still, the end of a second hour would see it drifted to position C by the action of the tide. If both these velocities acted together, the result would be the same, that is to say, at the end of one hour the ship would arrive at point C, having been travelling a course of 17 degrees at 10 knots.

Expressed briefly, the theory of the triangle of velocities is that the sum of two velocities acting on a body, if expressed by two sides of a triangle, will be shown by the third side of the triangle.

The wind has the same effect on an airplane in flight as the tide or current has on a ship at sea. In Figure II, if the plane were flying in the direction AC and the wind were blowing in the direction indicated by the arrow, the path the plane would actually make good over the ground, *i. e.*, its track, would be BD, although the course it would be steering by its compass would be BC, and the angle BCD would be its angle of drift. You see from this diagram then that the track of a plane and its groundspeed depend on the windspeed and direction, and the airspeed and direction.

The calculation that occurs most frequently is to find out the course you must steer to make good a certain track. When you are setting off from one place to another you find out the bearing from the map with the aid of a protractor. This is, of course, your track. By the same means you can also ascertain the distance. The windspeed and direction can generally be obtained from the Meteorology people and with these facts you can work out the course you will have to steer on your compass, and also what your groundspeed will be.

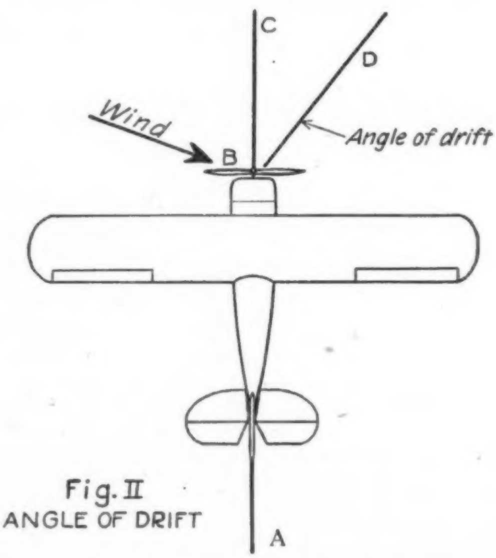


Fig. II
ANGLE OF DRIFT

In Figure III we will find the course to steer to make good a track of 24 degrees with an airspeed of 90 m.p.h. and a wind blowing from 315 degrees at 20 m.p.h. First of all, draw a line on a piece of paper with your ruler to represent the north and south line. You can draw this in any direction but it is usually easier to draw it up and down the paper, and you need it to align your protractor on when you draw your other bearings.

The next thing is to decide what scale you are going to use. In this example we have used a scale of 20 miles to the inch, and this is a useful scale to work with, but you may adopt any one you like. Now draw a line from a point A to a point B, 20 miles to scale from a direction of 315 degrees (this will be in a direction of 135 degrees), to represent the wind.

Another line has to be drawn from the same point A in a direction of 24 degrees to a point C to represent the track you wish to make good. It does not matter

what length you draw this line; the equivalent of an hour and a half's airspeed is generally enough. Do not forget to align your protractor with the north and south line during all these bearings.

You have now two sides of a triangle and to complete it, you measure a line representing 90 miles to scale (airspeed), and draw it from point B so that it just reaches a point in the line AC at D. The bearing of this new line BD will be the course you must steer and the distance to scale between A and D will be your groundspeed. In this example, the course to steer is 14 degrees and the groundspeed 80 miles per hour.

By completing the parallelogram the result is seen more clearly. The dotted line AE shows you where you would be if you flew at 90 m.p.h. on a course of 24 degrees in still air. If it were possible for you to remain in the air for a second hour with only the action of the wind affecting you, you would be blown 20 miles from E to D. With both velocities acting in conjunction, the result is the same, and by steering in the direction of BD (or AE—they are the same), you will be making good the desired direction shown by the line AC in Figure III.

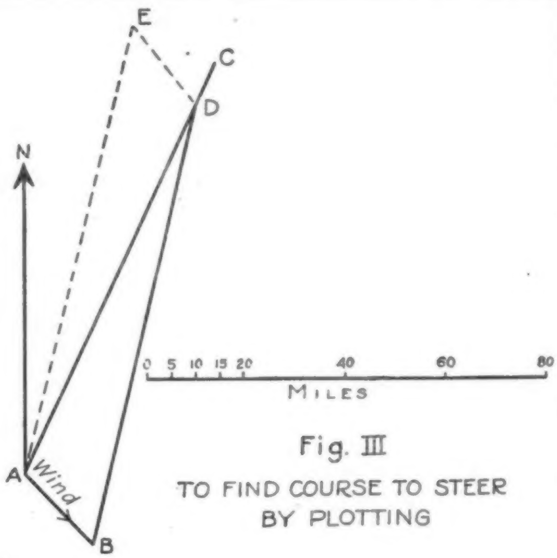


Fig. III

TO FIND COURSE TO STEER BY PLOTTING

In the next example, Figure IV, we will find the speed and direction of the wind. There are various other methods of working this out and these we will come to later. In the present case we will assume that we have been steering a course of 75 degrees as shown by our compass, and that our airspeed as calculated from the indicator is 80 miles per hour. From a map we have been able to tell that our track is 90 degrees and our groundspeed 95 m.p.h.

We know the time and place of our departure and perhaps a quarter of an hour afterward, we recognize a place we are passing over. We mark this on the map and draw a line between the two places, which line shows us the direction of our track, and measured to scale the number of miles we have travelled in the time taken, from this can be calculated our groundspeed. Now then we want to find out, or maybe just check our windspeed and direction, so that we may be able to set a proper course for the rest of the flight.

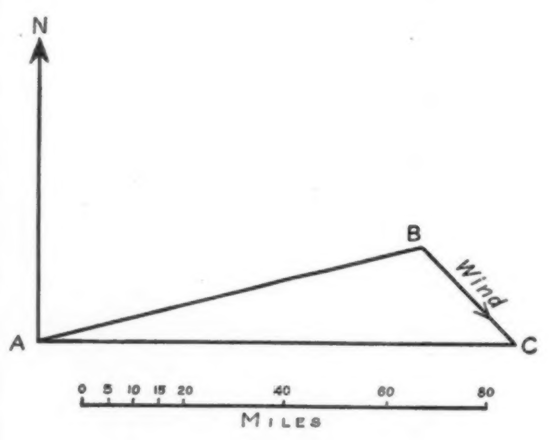


Fig. IV

TO FIND WIND SPEED BY PLOTTING

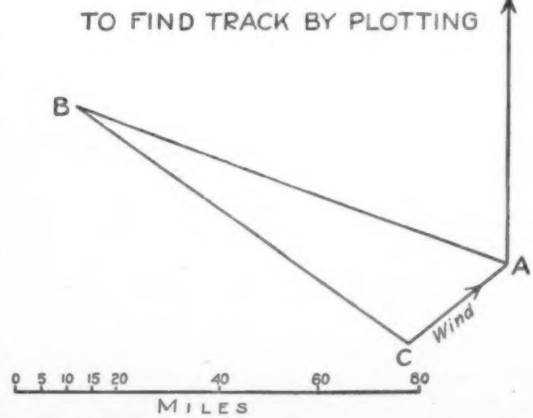
The north and south line is drawn first and then a line 80 miles to scale in a direction of 75 degrees, representing our course and airspeed. Mark this line AB, and then from A draw another line AC, 95 miles to scale in a direction of 90 degrees to represent our track and groundspeed.

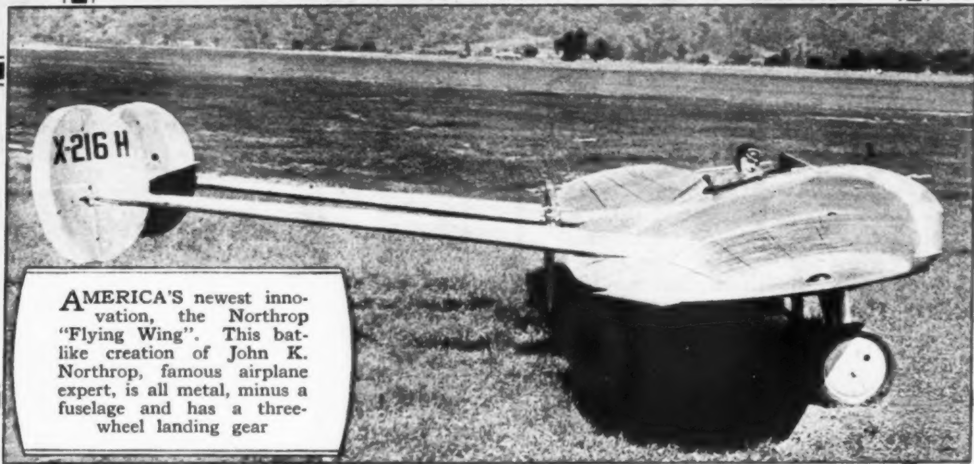
NOW here again are two sides of a triangle. AB is where you would have gone in still air and AC is where you actually have gone; the difference has been caused by the wind which has blown you in one hour from B to C. Draw a line from B to C and you have the speed and the direction of the wind; in this case 27 miles per hour from 317 degrees.

There is yet a third example to be worked out; to find your track and groundspeed when your course, airspeed, windspeed and direction are known. This is a calculation you are the least likely to make of the three, but it may be necessary under certain circumstances to plot out on your map, a line showing your actual track during a certain flight. We will imagine for example (Figure V) that your course has been (*Continued on page* 45)

Fig. V

TO FIND TRACK BY PLOTTING

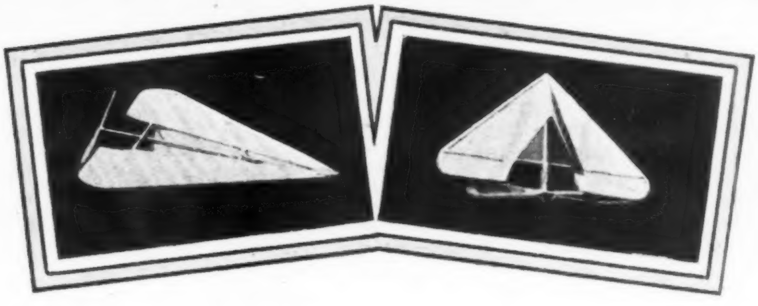




AMERICA'S newest innovation, the Northrop "Flying Wing". This bat-like creation of John K. Northrop, famous airplane expert, is all metal, minus a fuselage and has a three-wheel landing gear

A GRAPHIC photo of the giant Junkers G-38, the world's largest commercial monoplane, which attained a speed of 174 kilometers with five tons load. It was piloted by Captain Zimmermann during its tests

A TWO-CYLINDER "Aeronca" baby-plane, which completed on April 9, 1930, a non-stop flight from Cincinnati to New York in 10 hours and 10 minutes. It was piloted by Stanley Huffman
—P. & A.



How to Build the Arrow Model

An Unusual Plane that Will Stand Out in Your Collection

By
HERMAN PARENZAN
Aeronautical Research Expert

WELL, if it is true that a change is as good as a rest, then here's the rest you've been looking for, and, incidentally something novel in the way of model airplane building. After all is said and done, one cannot learn a great deal about airplane construction in general if one builds continuously the same old type of plane, possibly with a different name.

It is a good test of your skill and knowledge of aviation to build something new, and for that reason I have chosen the *Arrow* model.

With the *Arrow* model I hope to take you into the realms of Continental model builders, who strive more for the novel in model plane construction, rather than for copying everyday planes, and hence stimulate initiative among the model builders themselves.

Don't forget that it is the man with the inventive turn of mind who succeeds, and it is from such men who think and act for themselves, that the aviation industry has derived its present success. With this in mind, let us turn to the *Arrow* model.

This model, incidentally, is based on the design of the earliest types of gliders — but we are going to apply rubber motive power to it.

Nearly every one of you at some time or other has made a paper dart. You will notice, then, how similar is the design of the *Arrow* model. What would happen if motive power were applied to such a dart? Let's build one and see.

The *Arrow* model, as is obvious from the photographs, has a large chord and a small span. That is to say, it is much longer from front to rear than it is wide.

This type of wing is known as the LIDENTHAL (not to be confused with Lilienthal). Lidenthal was an Austrian expert who spent a great deal of time and money developing his theory, although few have ever heard of it!

Lidenthal once made the claim that his theory would supersede the theory applied to present airplane construction—even to the Junkers and Northrop "Flying Wing" types of planes. How true this claim will turn out to be can not now be calculated, but it is known that the British Air Ministry have been experimenting with a tailless pusher type monoplane for some years and with great success; and only last year a German firm built and flew successfully a monoplane of the same general type.

Joseph Nemeth, a Hungarian engineer, also has experimented with this type of plane, building three experimental models. Nemeth made his wings rectangular in shape and with large chord and small span. His first model was equipped with a 2½ horse - power motorcycle engine, and despite the proportional overweight, it flew, doing 48 miles an hour.

Nemeth's experiments, however, were not continued, and there have been few to carry on the theory advanced.

In 1914 I built two flying models based on the Lidenthal theory; one a

Necessary Materials

2 pieces	1/32 x 3/32 x 10 3/4"	balsa	for A
2 "	1/32 x 3/32 x 10"	"	B
1 "	1/32 x 3/32 x 7 1/2"	"	E
1 "	1/32 x 3/32 x 1"	"	F
1 "	1/32 x 3/32 x 4 1/2"	"	D
1 "	1/32 x 3/32 x 10 1/4"	"	C
1 "	1/8 x 3/32 x 9"	"	motor stick
2 "	1/32 x 2 3/4 x 9"	"	elevators
1 "	1/4 x 1/2 x 5 1/8"		propeller
1 sheet		tissue	covering
1 shaft		wire	fittings
1 hook		"	"
1 washer		copper	bearing
1 hanger		aluminum	"
16 1/2"	.045 sq.	rubber	motor
1 piece	1/16" thick	aluminum	nose piece
1 small bottle		ambroid	glueing
20" long		threads	fastening

See Plans on Pages 26 and 27

monoplane and the other a biplane. The models proved to have extraordinary load capacity, and sufficient speed and stability. This despite a low powered engine.

Earl McClary, a Californian, also experimented with this type of model, although the results of his experiments have not been made generally known.

My first real *Arrow* model was built at the Aeronautical Research Laboratory for Prince Emil Sturdza of Roumania. Wind-tunnel tests were made with a metal model.

No difficulty will be experienced in building the *Arrow* model, and only a small amount of material is required.

The wing skeleton consists of the pieces of balsa marked A, B and E in the drawings. A is 10 3/4", B 10" and E 7 1/2" long. All five pieces are made from 1/32" x 3/32" medium balsa wood, and are joined together as shown in the drawings.

Now, from 1/32" balsa, cut out the two elevators. Their shape is shown in the drawings, which, incidentally, are full size and need only to be traced. Taper the ends of the elevators, and, as shown in the drawings, fasten them to E. Also ambroid in place the piece F. Cover, on top, the space between A and B with Japanese tissue.

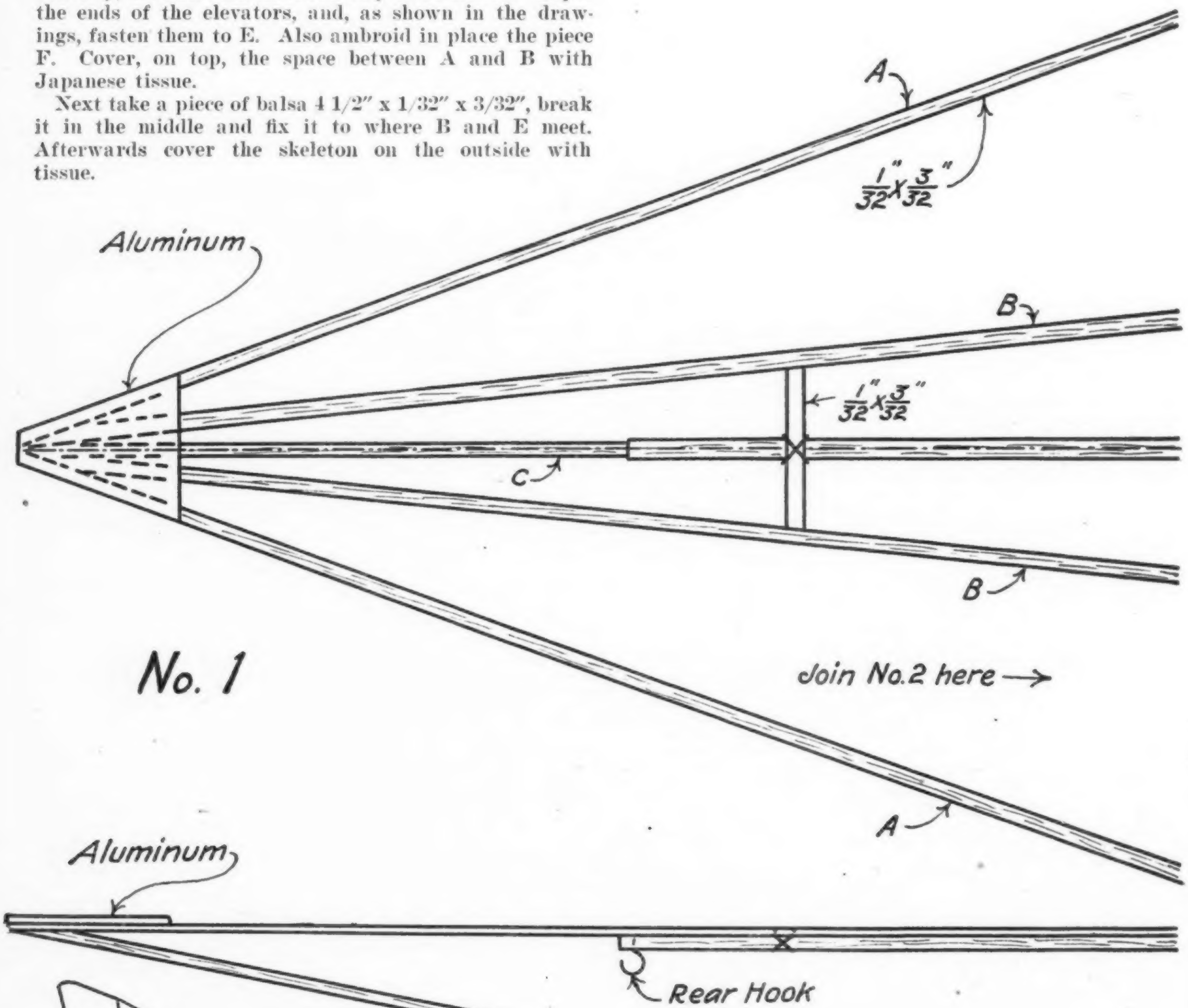
Next take a piece of balsa 4 1/2" x 1/32" x 3/32", break it in the middle and fix it to where B and E meet. Afterwards cover the skeleton on the outside with tissue.

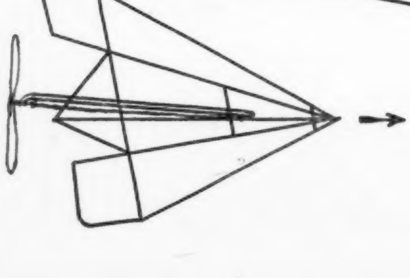
Then make the motor stick from 9" x 1/8" x 3/32" balsa and attach the usual hanger and rear hook.

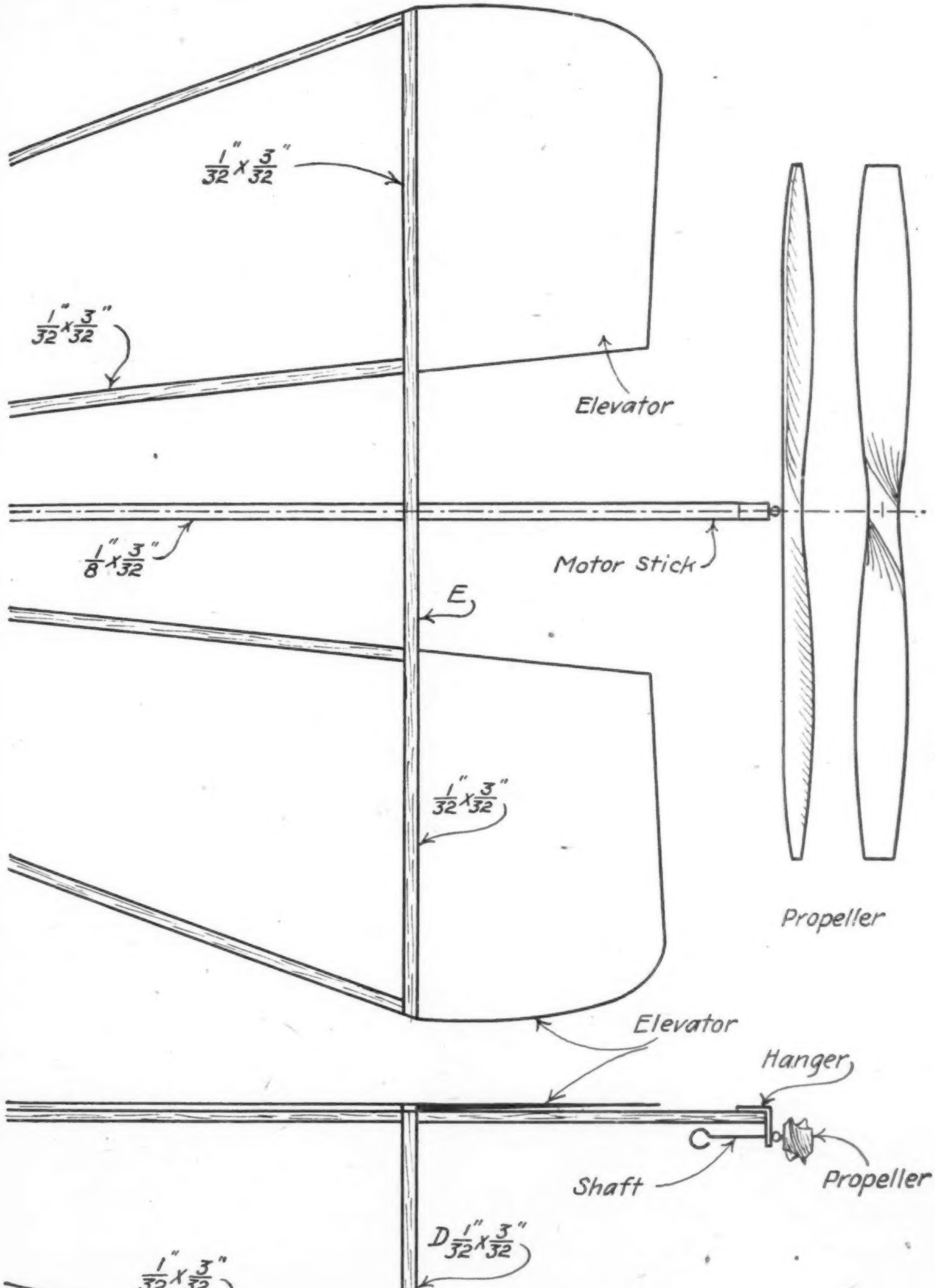
The propeller is 5 1/8" and is carved to shape as shown in the drawing. The power consists of two strands of .045 rubber. The motor stick is attached to the model by thread or rubber at the two cross-pieces.

Next fix to the nose of the model a piece of 1/16" aluminum, cut to shape and size as shown in the drawing.

The finished model should weigh about .140 ounces. Test it for fore and aft balance by gliding it and moving the motor stick backwards or forwards. Lift the left (from the front) elevator slightly and the model will glide to the right, but will fly straight with the propeller turning. With elevators neutral, the model will circle to the left. With a small application of glycerine it is possible to get 600 to 900 revolutions from the rubber bands.





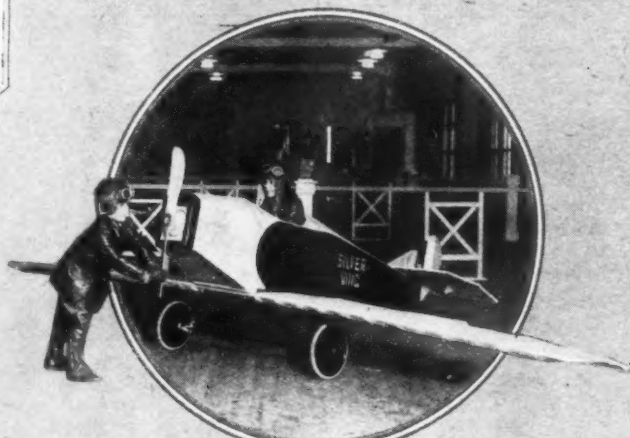


1"/32 x 3"/32
1"/32 x 3"/32
Elevator
1"/8 x 3"/32
Motor Stick
E
1"/32 x 3"/32
Propeller
Elevator
Hanger
Shaft
Propeller
D 1"/32 x 3"/32
1"/32 x 3"/32

No. 2

ONE section of the exhibition at the Grand Central Palace air show which elicited the admiration of all visitors was the display of non-flying scale models and dirigibles shown at the right. These were constructed by school children of New York City and the evidence of their remarkable craftsmanship made that spot one of the most popular attractions at the show

International

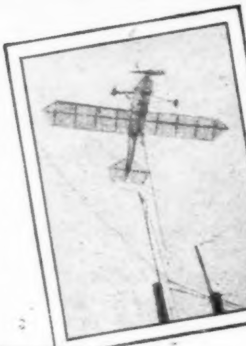


JEAN and Marcell Pastorett (center) look over a model built by Walter Pinnell, a 15-year-old school boy, which was displayed at the same show

International

CAPT. WILLIAMS of the Air League (left) explaining the features of a model at a school boys' exhibition at Horticultural Hall, Westminster, England

Underwood & Underwood



Jimmy Callahan (below) is shown with his Bernard Pursuit plane. At right is a model built by Milton Goldstein, and center, Samuel Darefsky with one of his models

Jean Appleyard, secretary of the Hat-in-the-Ring Squadron, with her stick model, and left, two models by Ray Duffey, a Michigan model airplane enthusiast

The American Sky Cadets

Contest Reports from Detroit, Sandusky and Canada

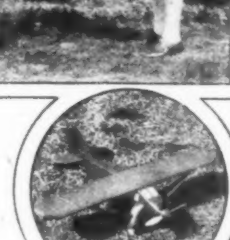
THREE times a national model aircraft champion, Henry Rainey, 16-year-old Detroit boy, added new laurels to his already formidable list when he captured, yesterday afternoon, the baby R. O. G., (hand-launched) championship of the American Sky Cadets in Michigan.

The official time for his flight was 256 seconds, clocked by officials of the Detroit department of recreation.

"Rainey's splendid flight," writes Mr. F. D. Van Luven, Honorary National Commander for the Central States, "was one of the high-lights of the American Sky Cadets' tournament at Cass Tech auditorium, the first contest sponsored by this newspaper since the *Detroit Daily* division of the Sky Cadets was organized three months ago.

"More than fifty boys and girls participated in the events and enthusiasm and rivalry ran high throughout the afternoon. The tournament was pronounced a real success and it may be observed in passing that it was the forerunner of many similar events in the future.

"Next in importance to the flight of Rainey's tiny ship, equally good in their class, were the performances of the models built and flown by three other Sky Cadets.



William J. Zander is shown with one of his models and Bettie Lee Wood with a Yellow Bird model built by herself. Circle at left shows a model built by Jack C. Hanner. The model at the right was built by C. Nastle

They were established by Vernon Horsfield, 15, 72 E. Philadelphia, whose miniature commercial plane rose from the auditorium stage and flew for 32 seconds; Kenneth Tripp, 14, 1219 Calvert, who won the junior B group championship with a flight of 108 4/5 seconds with his baby R. O. G., and Mary Roll, 14, 4439 Bingham, Dearborn, whose model sailed through the air for 63 2/5 seconds.

"Sky Cadets Rainey and Horsfield each were awarded gold medals as champions of the two major events. Seven other contestants who placed in the events won free airplane trips.

"Sky Cadet Kenneth Tripp, winner of the junior title, will view the lake district of Oakland county from the cockpit of a Fleet biplane, through the courtesy of National Airways, Inc.

"Although he has only been building and flying model planes for two years, Sky Cadet Henry Rainey, who won the Michigan A. S. C. championship, has compiled a record for all members of the organization to shoot at.

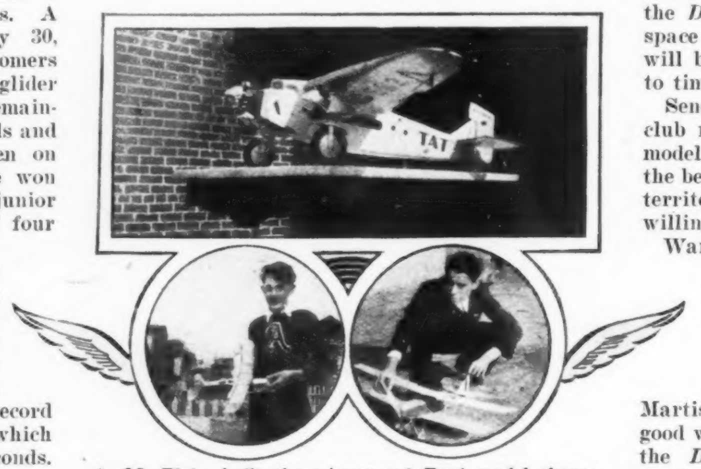
"Henry holds three different national and world's

Starting early! Wilbur Goltermann, age 11, of 46 Franklin Avenue, River Forest, Illinois, shows his air-mindedness in the model depicted above, which he built from material found about his home

titles, won in tournaments conducted by the Airplane Model League of America.

"On December 5, 1929, he captured the record for miniature biplanes with a flight of three minutes. A month later, January 30, 1930, he defeated all comers in a national model glider test, his miniature remaining in the air 28 seconds and gliding 69 feet. Then on May 23, this year, he won the commercial title, junior class, with a flight of four minutes, 44 seconds.

"Henry also holds the present all-Detroit junior championship for biplanes. On July 30, this year, at Grosse Ile airport, he broke the world's junior record with a tractor model which flew nine minutes, 58 seconds. The same day he had an unofficial flight of 11 minutes. Henry is in the 10th grade at Cass Tech and lives at 12,326 Dexter. He is well-known among model airplane enthusiasts.



A. M. Blake built the tri-motored Ford model shown above. Howard Detz is shown (left) and George Hoffman (right) displaying models built by themselves

"The complete list of winners follows:

BABY R. O. G. (HAND LAUNCHED)

Senior: First—Henry Rainey, 16, 12,326 Dexter. Time: 256 seconds.

Second—Baldo Bonadeo, 16, 11,398 Broadstreet. Time: 101 seconds.

Consolation—Emanuel Feinberg, 16, 2,937 Tuxedo. Time: 99 seconds.

Consolation—Michael Roll, 16, 4,439 Bingham, Dearborn. Time: 99 seconds.

Junior: First—Kenneth Tripp, 14, 1,219 Calvert. Time: 108 4/5 seconds.

Second—Gordon Plaxton, 14, 15,436 LaSalle. Time: 56 seconds.

BABY R. O. G. (HAND LAUNCHED)

Girls' Event: First—Mary Roll, 14, 4,439 Bingham, Dearborn. Time: 63 2/5 seconds.

Second—Lillamae Price, 11, 5,217 Argyle. Time: 44 seconds.

MINIATURE COMMERCIAL (Take-off from floor)

First: Vernon Horsfield, 15, 72 E. Philadelphia. Time: 32 seconds.

Second: Henry Rainey, 16, 12,326 Dexter. Time: 23 3/5 seconds.

"The well-known hard luck jinx pursued two contestants. The sufferers were Sky Cadets Emanuel Feinberg and Lillamae Price, 11-year-old girl miniature enthusiast. Emanuel's contrary little ship flew like a gull, except when officially timed, and Lillamae's, after two brave flights, decided to roost in one of the light shades near the ceiling—and it's there yet."

The Detroit Sky Cadets are an ambitious group and have aims, which summarized briefly, are:

With the end of summer school vacation, they hope to organize Squadrons and Flights of Sky Cadets in the city schools and stage inter-squadron contests.

A glider club for older members (15 to 21) will be formed and a system of financing a ship worked out.

Efforts will be made to obtain free tuition at a local aviation school for at least one Sky Cadet this winter.

All Sky Cadets in Michigan, Illinois, Wisconsin, Ohio, Minnesota and Iowa are advised to get in touch with Mr. Van Luven, in whose territory they are, so that their activities may be published in the *Detroit Daily* where, if space allows, photographs will be published from time to time.

Send Mr. Van Luven your club reports. He is a great model enthusiast and one of the best boys' leaders in your territory. He always will be willing to help you.

Warm appreciation is extended to Gerald Todd, recreation director of model aircraft, and his assistants, John J. Sullivan and John J. Martis, for their hard work, good will and cooperation in the *Detroit Daily* tournament.

GALT, CANADA, MEET

Model airplanes, flying 200 feet in the air, banking and diving just as their big brothers, were the feature of the model airplane contests


American Sky Cadet John Romary of Burlington, Kan.

American Sky Cadet Frank Sacks of Marcus Hook, Pa.

held recently at the Y.M.C.A. and Victoria Park, Galt, Ontario, Canada.

The light models constructed by the boys during the past winter and summer, under the direction of John T. Dilly, although somewhat handicapped by gusty weather, performed faultlessly, quite worthy of the amount of labor put into them by their enthusiastic builders.

Alex. Smillie, with fourteen points, was the winner of the outdoor contest, and in three sections—R. O. G., open and indoor contests, each consisting of commercial models. John T. Dilly was a close second with a total of ten points. Ernest Barrie was third with eight, and Bruce Peacock fourth with four.

High-lights of the contests were the sensational flying of Smillie's Culver model and John T. Dilly's special R. O. G. While no new records were established by the model planes, the time in some of the races was exceptionally fast, and high altitudes were reached by the different machines.

Results were as follows:

Outdoor, R.O.G.—John T. Dilly, Ernest Barrie, Alex. Smillie. Time: 36 3/5 seconds.

Outdoor, Open—Alex. Smillie, Ernest Barry, John T. Dilly, 55 2/3 seconds.

Outdoor, Commercial—Alex. Smillie, John T. Dilly, Ernest Barrie, 5 1/10 seconds.

Indoor, R.O.G.—Bruce Peacock, Alex. Smillie, John T. Dilly, 23 1/5 seconds.

Indoor, Open—Alex. Smillie, John T. Dilly, Bruce Peacock, 43 seconds.

Indoor, Commercial—Ernest Barrie, Alex. Smillie, John T. Dilly, 10 2/5 seconds.

With Old Sol, a blue sky and a strong gusty breeze to help things along, the October New York Model Airplane Derby in Central Park, New York, was a monstrous success. Activities began on the stroke of ten and with hundreds of eager boys participating and extremely generous with their applause, the meet was a success.

American Sky Cadet A. Kowalski of Chicago, Ill.

The tournament was held in the Sheep Meadow, Central Park, under the supervision of the Department of Parks, Walter R. Herrick, Commissioner of Parks, and James Mulholland, Supervisor of Recreations. The meet was open to members of the *Graphic* Junior Aviation Club, the New York Junior Aviation League and the American Sky Cadets.

Eddy Kuhn and Wayne Hoag, officers of the Hat-in-the-Ring Squadron with their record twin pusher

The first event was for the twin pushers and there were one hundred and sixty-four entrants for the contest.

The final score for this event revealed that Thomas Boland led with two minutes, 49 seconds; followed closely by Walter Calhoun with two minutes, 36 seconds, and John Werner, third, with a time of one minute and 43 seconds.

The commercial models were next in the limelight and proved to be one of the most interesting contests of the meet. This was for enclosed cabin flying models and inasmuch as it was the first time this particular type had ever been used in an official New York City Model Plane Derby it elicited much praise from the crowd. There were 159 models entered in this contest.

The winner was Thomas Boland, with the time of 3 minutes, 16 seconds; Frank Ziack with 3 minutes, 4 seconds to his credit, was second; and Ted Belak with 1 minute, 26 1/2 seconds, third.

The free-for-all speed event next made its initial appearance in a New York City (*Continued on page 41*)

Among New York's outstanding model airplane enthusiasts is Bernard Curry, son of Mr. John F. Curry, the eminent political leader. Bernard is seen (left) with a scale model of a Boeing Pursuit plane at the New York City Model Airplane Derby at Central Park, N. Y. Grouped around him are the judges of the meet. They are (left to right) Mr. Lawrence Shaw, Mr. Armour Selley, Mr. Alex Johnson, Mr. Charles Grant; and in the foreground, Captain Loftus-Price and Mr. John Hultrunk

A Course in Airplane Designing

By Mastering This Valuable Course, the Model Builder of Today Lays the Cornerstone for His Career as the Aeronautical Engineer and Designer of Tomorrow

By KEN SINCLAIR

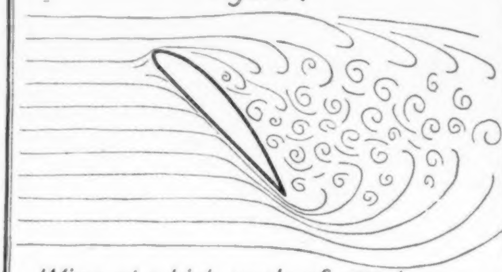
Article 14.

IN presenting this course, MODEL AIRPLANE NEWS wishes to stress the fact that model building is more than a mere sport. If the builder of model airplanes learns the fundamental principles underlying airplane flight and design, he prepares himself for a future career in the most profitable phase of aviation.

The policy of MODEL AIRPLANE NEWS is not to encourage or teach its readers to become pilots, but rather to become aeronautical engineers, designers, salesmen, manufacturers, or equip themselves for any other positions which require the training of the specialist or executive. Study this course from month to month, master it in every detail and you will gain a fundamental knowledge of the how and why of airplane design which will be second to none.

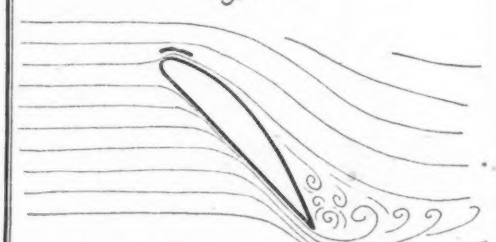
THE EDITOR.

Figure 1



Wing at a high angle of attack

Figure 2



Effect of slot

ONE of the most important tools in the airplane designer's equipment is a complete and comprehensive knowledge of the stall, for the stall, in various forms, is the cause of nearly all accidents to full-size ships, as well as to models.

When a model airplane builder wishes to get the very best possible flight out of his ship, he adjusts it so that it will climb as much as possible without stalling. To do this successfully, he must recognize a stall as soon as it occurs, for every stall entails a loss of altitude, and, at the same time, a loss of distance. It may even send the ship into a spin. This means, to the model airplane, a crash.

To adjust the model so that it will climb rapidly and yet keep out of a stall requires keen observation of its flight and instant recognition of stalls should they occur. More than that, the ship should be so designed that it will not stall easily, and will recover quickly if it should stall.

There is nothing mysterious about it. A stall is simply a loss of flying speed, and, therefore, a loss of the wing lift that is necessary to sustain the ship. The thing that must be grasped is that a stall may occur in different attitudes of flight. Contrary to general opinion an airplane does not necessarily have its nose pointing skyward when it stalls, nor does the term "stall" have anything to do with the motor.

Figure 3

Section of a wing equipped with both slot and flap

For example, if a ship is gliding, with the motor idling and producing no thrust, it must head down and "coast", with gravity supplying the force needed to keep the wings passing through the air rapidly enough to retain the necessary lift. But suppose the ship was not nosed down sufficiently, but was gliding "flat." What happens?

First, the airplane gradually loses speed, and then, as the speed drops, the wings begin to lose their lift. Soon there is not enough lift to support the weight of the ship and it noses down, picking up speed rapidly, until it is again traveling at sufficient speed. This process uses up quite a bit of altitude. Pilots are very careful to keep out of stalls when close to the ground.

We have seen that a stall (*Continued on page* 39)

Figure 4

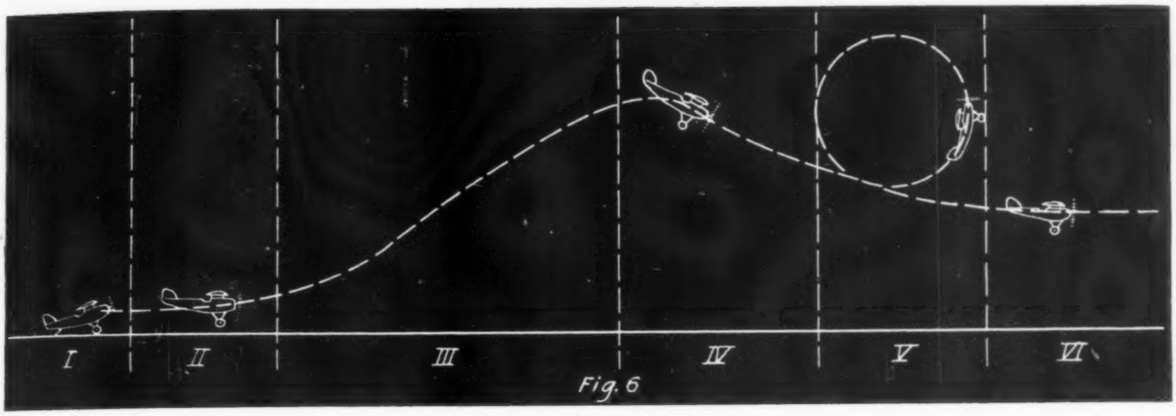


Fig. 6

HOW TO STUNT Your Models by Automatic Control

A Device Easy to Make for All Types of Planes

By Prof. T. N. de BOBROVSKY

IT is the dream of every model enthusiast to see his models loop, bank, spin and go through every stunt that the experienced pilot does with his airplane. In the fascinating history of model flying, the first model to perform automatically controlled trick flights was witnessed at the second annual model meet in 1908 in Paris, France. The model was made by Levilleux and Fordu and flew in circles, spirals and figure 8's. This was the first model equipped with an automatic device to move the tail surfaces while in flight.

Several commercial toy models appeared on the markets of Europe shortly afterward that were supposed to do figure 8's and spirals, but, like most well advertised and overrated models, most of these failed to do what was expected of them. From that time on, up to the present, very few successful stunt flying models have been made. I have seen several models equipped with an automatic parachute dropping device, or models capable of making one loop. However, this looping model made the loop as soon as released from the hand and landed as soon as the loop was completed.

However, the model builder gets a helping hand from the scientific flying model experimenter. There are several important phases of aviation with which we are not quite familiar; for instance, the spin. Flying models have proven themselves very effective means for experimenting with these unfamiliar phases of flight.

In the first place, the flying model needs to be so constructed that it will enter and come out of a required maneuver while flying normally. This requires automatic, movable surfaces.

In this article will be found a description of one of these automatic controls that I have used successfully since 1912. Of course, the device used at that time was very crude but, keeping in step with the progress in aviation, I have improved it since then. This device can be used in the common fuselage model, as well as the scale model. As a rule, it was used on models varying from three to six feet, but it will also function on smaller models.

The construction of this device is very simple, light and causes no center of gravity disturbances. With a little skill, it can be made by any model enthusiast and its uses are unlimited.

This little apparatus will enable a model to get off to a quick start, do fast climbing, figure 8's, ziz-zag flights, loops, barrel rolls, upside-down flights, tail and flat spins, stalls, whipstalls, land at low speed; or, in other words, any stunt or trick flight at all.

It can be used on a speed model to retract the landing gear after the take-off and to lower it again before landing. In the case of an amphibian which lands on water or land, it can be used to change the propeller pitch while in flight. Its other uses are to operate a variable camber wing, to drop small bombs or to release parachutes, etc.

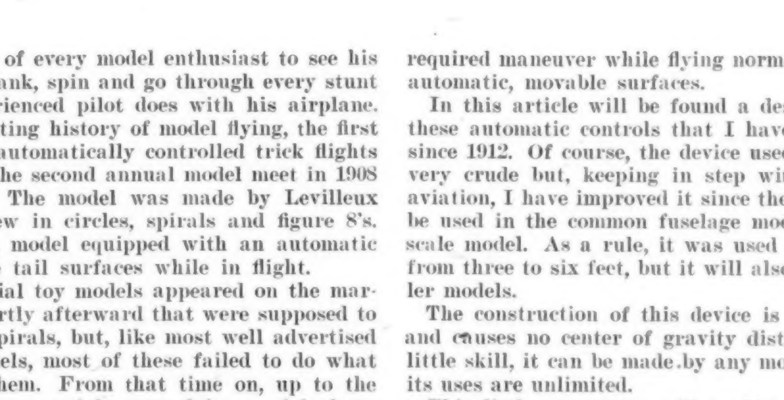


Fig. 1

Figure 1 shows a side view of a high-wing monoplane which is rubber driven. Its construction differs from the ordinary flying mod-

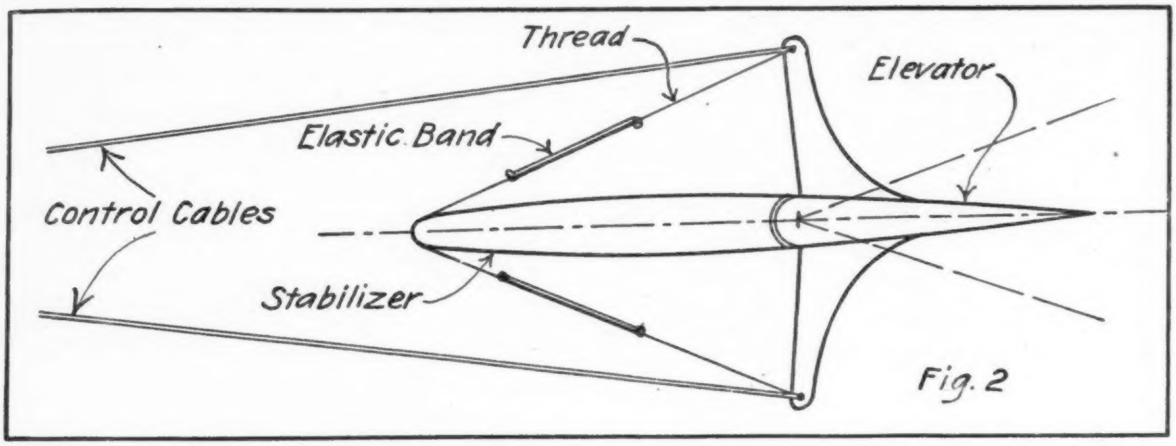


Fig. 2

el only so far as the ailerons, elevator and rudder are movable as on the full-sized plane. It is important that all these surfaces should move freely.

These control surfaces are held in normal position with thin threads and elastic bands, as indicated in Figure 2. The elastic bands should be fresh and of the same size throughout.

As shown in Figure 3, a small wooden pulley (2) is fastened to the propeller shaft (1). This pulley is connected with an elastic band (3) with a pulley above it (4). The position of the pulleys can also be seen in Figure 1. Pulley (4) is attached to a long, fully threaded thin steel shaft (5). It can be seen then if the rubber motor (6) revolves propeller (7), the transmission (3) will also set shaft (5) in rotation.

The diameters of the two pulleys (2 and 4) are identical. As can be seen in the drawing, shaft (5) revolves in two metal bearings (8). On shaft (5) will be noted a small nut (9) to which a small arm (10) is soldered. The thin arm (10) slides in a narrow slit cut in the wooden base (11), which extends from two bearings (8).

As shaft (5) turns, and since nut (9) cannot turn with it on account of the small arm (10) being in narrow track (11), it will move toward rear bearing (8).

It is essential that this device be made to operate with as little friction as possible, which will not necessitate using any more rubber band for motive power than usual.

Figure 4 shows how a small metal strip (12) is attached to nut (9). To the right and left side of the device described above, two strips of narrow balsa (13) are glued to the fuselage of the model. Out of aluminum make a few strips (14) and fasten one with a screw (15) to the balsa wood strip (13); at the *b* end of this aluminum arm (14) fasten a thread (16) and connect same to the rudder, as shown in Figure 5.

See what happens.

As the rubber motor is wound up and the propeller released, elastic band transmission (3) sets threaded shaft (5) revolving, also, and nut (9) starts to move toward the rear.

During this time the model has taken off and is flying straight ahead. When the arm (12) on nut (9) touches protruding arm (14) and presses against it, string (16) is correspondingly pulled, which in turn pulls the rudder to one side. The result is the model makes a turn!

If the *a* end of aluminum arm (14) is long, the rudder will be held to one side longer; if the arm is shorter, the turn will also be shorter. As the arm (12) on nut (9) passes beyond reach of the aluminum arm (14), the pull on the thread (16) ceases and the elastic bands shown on Figure 2 automatically pull the rudder back to its normal position.

Any number of these small arms (14) can be attached to the balsa wood strips (13) on either side of this device and their *b* ends attached to any one of the controls, depending on what stunt you (*Continued on page* 42)

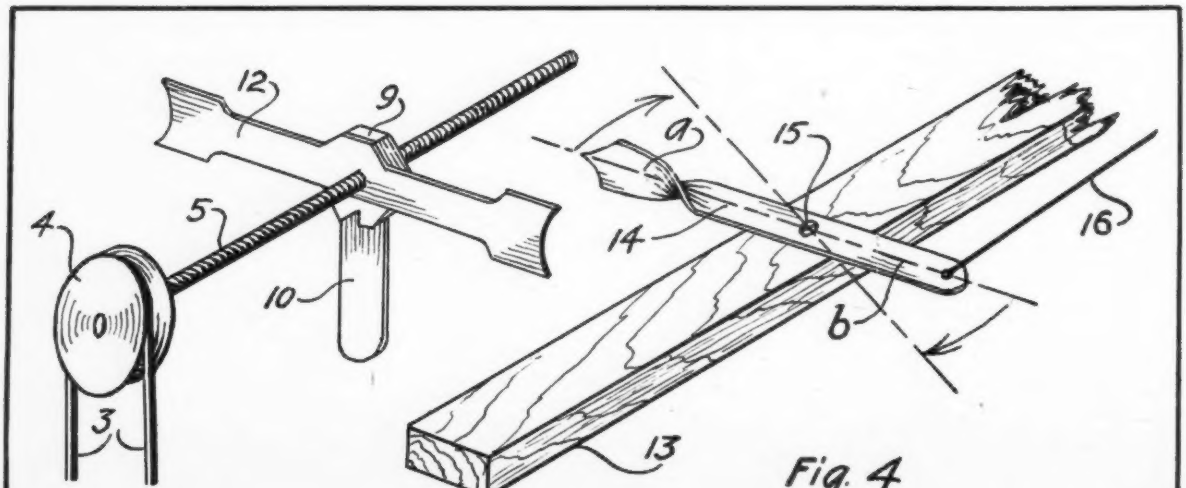


Fig. 4

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Capt. H. J. LOFTUS-PRICE
(Ex-Royal Air Force)

CHAIRMAN OF THE BOARD

WELL, believe me, it was necessary to use the old thinking cap after publishing some of the 250 questions compiled by Mr. Gilbert G. Budwig, Director of Air Regulations, Washington, D. C., which were used to illustrate the wide scope covered in written examinations for various types of licenses. These questions, you will remember, were given in our July issue. Since that time we have been inundated with requests for the answers to them, so here goes.

The answers are given in the same order as the questions:

1. No.
2. Yes.
3. At 1,000 feet with normal flight except by special permission, or at a minimum of 2,000 when stunting.
4. No. Expressly prohibited.
5. (a) There are two ways; either pull the controls all the way back, cut off the engine, use opposite rudder and controls in neutral when the plane levels off; or put controls in neutral until the plane is in a straight dive, cut off the motor, pull gently out of the dive. (b) Chiefly the controls feel loggy, the plane is in a stalled position with a blast of wind coming from the side of the lower wing.
6. In increasing the angle of incidence or rigger's angle on the wing pushed down by the torque.
7. It aids lateral stability in still air and increases pitching or rolling under certain conditions in rough air.
8. Nose heaviness may be caused by improperly adjusted stabilizer. Left wing heaviness by incorrect adjustment of incidence. Excessive vibration by ignition trouble, unbalanced propeller, loose holddown bolts, loose propeller, etc.
9. Loose bearings, thin oil, overheated oil.
10. Dirt or oil on fins, poor mixture, retarded spark.
11. Cumulus, Cirrus, Stratus, Nimbus.
12. Vertical air currents caused by sunlight or shade or the nature of the land which is being flown over; *i. e.*, hills and woods.
13. A capacity flash is likely to take place between cloud and ship and there is danger of getting into a destructive hail gust.
14. 267 degrees.
15. From smoke or the angle made by flags. Also by the angle of ground travel in relation to the ship.
16. By the use of heavy slushing oil and by carefully sealing the ends of the tubes.
17. By comparing fixed marks on both blades with fixed stationary marks.
18. The amount by which the top wing of a biplane overhangs the lower wing is called the "stagger". A thimble is a metal protection for an eye or loop made in a cable. A turtle-back is the rounded top of the fuselage behind the pilot's seat. A walking beam is placed in the lower wing along the side of the fuselage to form a walking space. A routed spar is a spar grooved along the center so that an "I" section is produced.
19. The overtaking craft shall keep out of the way of the overtaken craft by altering its course to the right and not in a vertical plane.
20. They are marked by tubular streamers with alternate bands of red and white.
21. S. O. S. (On many of the European Continental lines the signal "m'aidez", which is the French for "help me" is used. Airmen generally refer to this as the "May Day" call, as the word is pronounced exactly like that.)
22. Three to five.
23. Air currents produced by differences in temperature.

—o—

General interest in helicopters has been considerably heightened by the recent tests of the Curtiss-Bleecker helicopter, which has been secretly developed during the past four years by the Curtiss Aeroplane & Motor Co.

The Curtiss-Bleecker machine consists essentially of four large wings or blades, mounted at right angles to one another and revolving in a horizontal plane. The wings are caused to revolve by propellers, one to each wing, mounted forward of the leading edge, about two-thirds of the way out; the propellers are driven through a gear and shaft arrangement from one central *Wasp* air-cooled engine, mounted horizontally.

TO each of the wings are attached outrigger booms mounting small elevators or tail surfaces. Thus, each unit is in reality a small airplane, consisting of a power-driven wing with a tail which can control the angle of incidence at any point.

Beneath the four wings is suspended a small fuselage in which are located the crew and which is equipped with a fairly conventional type of landing gear.

While the machine resembles somewhat, in outward appearance, the de la Cierva autogyro which has shown considerable promise, there is one fundamental difference in design that is immediately apparent from an inspection of the two machines. The Curtiss-Bleecker wings are made to revolve by the pull of their propellers, whereas in the autogyro, the rotation of the wings is a result of the forward motion of the entire machine.

This design difference means that the Curtiss-Bleecker machine can rise vertically off the ground without any run and can hover indefinitely over any spot, performances which cannot be accomplished with the autogyro.

The development of the Curtiss-Bleecker helicopter has taken up four years of intensive research and study in the Curtiss Wright Engineering Laboratories under the direction of T. P. Wright, Chief Engineer, and M. B. Bleecker, inventor of the machine. The original principles of the helicopter were evolved by Mr. Bleecker while he was a student at the University of Michigan. Bleecker experimented with the design during his studies at Michigan and later, while he was employed in an engineering capacity at

(*Continued on page* 43)

THE Macfadden Aviation Advisory Board will endeavor to answer questions concerning model building and aviation in general, where the questions do not apply to contests being conducted by this or other publications. Address all questions to

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Macfadden Aviation Advisory Board,
MODEL AIRPLANE NEWS
1926 Broadway,
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Enclose with your letter a self-addressed and stamped envelope to facilitate an answer. Space is limited and all letters can not be answered in these pages.

Gliding and Soaring

(*Continued from page* 11)

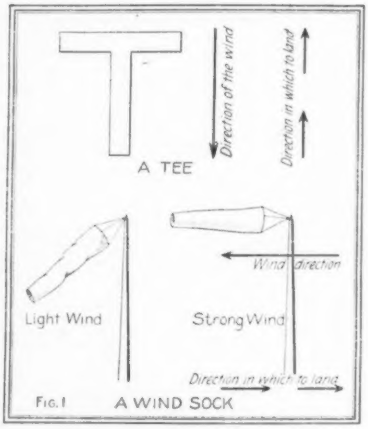

FIG. 1 A WIND SOCK

perfectly co-ordinated movement of all the controls.

Bank. In a turn, the nose of the glider is swung sideways by a movement of the rudder. Use of the rudder is not, however, sufficient to effect a correct turn; just as the bicycle rider leans inward when going around a corner, so the glider must be "banked."

To bank the glider means to lower the wing which is nearer the center of the arc of the turn. For example, in a left turn, the ship is banked to the left; *i. e.,* the stick is pushed to the left, lowering the left wing. Banking is necessary to offset centrifugal force, which would otherwise cause the plane to skid.

Steps in Making a Turn. In order to render the process of making a turn easier to comprehend and to remember, it is divided here into five distinct sets of control movements. In actual flight, these movements are so closely connected that no separate steps are discernible; the controls are in gradual, continuous movement. These five steps are shown in Figure 6.

First Step: Stick Forward. During a turn, the glider's drag is increased and its life decreased; the sharper the turn, the greater the loss of speed. Therefore, before the turn is begun, it is necessary to dive the ship a little. Push the stick slightly forward and keep it there. Do not neglect the elevators when you are half through the turn, allowing them to drop. Speed is essential to flight, and flying speed may be lost if the stick is not held forward. Do not start a turn, unless you have sufficient altitude to be able to dive slightly.

Second Step: Going into the Turn. In order to start the plane turning, both rudder and bank are necessary. To make a right turn, push your right foot forward on the rudder-bar, and move the stick to the right. For a left turn, the reverse of these control movements should be used.

Third Step: In the Turn. More rudder and bank are required to start the turn than are necessary to keep the glider turning. When the ship is banked, the higher wing describes a wider arc than the lower wing (see Figure 2). It travels at a greater speed, and consequently has more lift. Therefore, the plane, once banked, tends to bank itself further. Steep banks, resulting in sharp turns, are however, dangerous. They must never be attempted except in soaring flight, and when the speed of the plane is high.

Pressure on the rudder-bar and stick should, therefore, be relaxed as soon as a bank of fifteen to twenty degrees is reached. In order to counteract the ship's tendency to bank farther, considerable movement of the stick toward the upper wing may be necessary. The amount which the rudder should be moved can be learned only by experience.

Fourth Step: Coming Out of the Turn. To leave the turn, apply opposite rudder and aileron; *i. e.,* to come out of a right turn, move the stick to the left, and push your left foot forward on the rudder-bar. The plane will gradually return to its normal position.

Fifth Step: Neutralizing the Controls. As soon as the turn is completed, put the stick and rudder-bar back into neutral. If you continue to hold them in the position where they were at the end of Step Four, the glider will start to turn in the opposite direction.

S-Turns. If the controls are not returned to neutral at the end of the turn, and the glider does start to turn in the opposite direction, the result will be an S-turn. An S-turn is a turn in one direction followed by a turn in the other. The change from one turn into the next must be a gradual and continuous one, otherwise the maneuver will be jerky. S-turns can be made only after you are capable of comparatively long glides. They are an excellent means of practicing turns. (See Figure 3.)

Note: Any number of successive S-turns can be made in a glider which is towed behind an automobile at a low altitude. (See Figure 3.)

Skidding and Slipping. If rudder and bank are not used proportionately during a turn, a skid or a slip will be the result. A skid is a slide of the glider outside of its path of flight. (See Figure 4.) It is caused by an undue pressure on the rudder-bar, coupled with insufficient bank.

A skid is evidenced by a feeling of wind on the side of your face near the raised wing. (You must learn to notice the currents of air which strike your face; they are highly significant.) To counteract a skid, relax some of the pressure on the rudder-bar, probably even with some pressure temporarily in the opposite direction.

A slip is a slide of the glider inside its path of flight. (See Figure 5.) It is due to too sharp a bank and corresponding insufficient pressure on the rudder-bar, and should be cor-

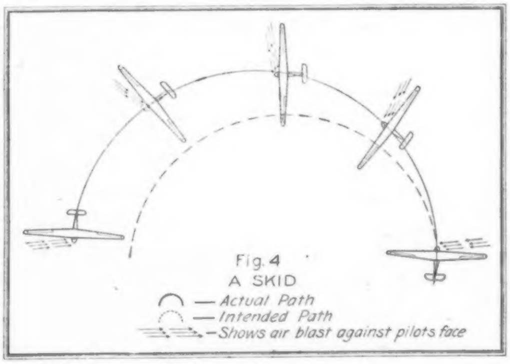
Fig. 4
A SKID
— Actual Path
— Intended Path
— Shows air blast against pilots face

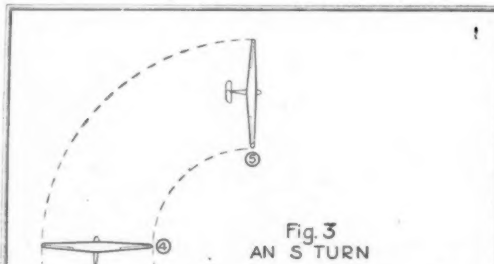

Fig. 3
AN S TURN

rected, either by a decrease on bank or by an increased amount of rudder. Air pressure on the side of your face near the depressed wing will make you aware that you are slipping.

Skids and slips are dangerous because they cause loss of speed. It is, however, practically impossible for a beginner to use rudder and bank in exact proportion at first. Therefore, if you feel that you are losing control, the safest plan is to come out of the turn by applying up rudder and aileron, and to dive to regain speed.

Conclusion. Turns are the very essence of gliding.

Practice them until they become second nature to you. If you find that you are able to turn in one direction more easily than in the other, practice the more difficult turn, until you can make them both equally well.

You cannot even fly straight without knowing the principles of turns; for the glider continually tends to deviate from its correct course, and you must be able to turn in order to counteract this tendency.

—o—

FOUR THINGS TO REMEMBER ABOUT TURNS

1. Push the stick forward before beginning to turn.
2. Use rudder and bank simultaneously and in proportion.
3. When you feel a strong air current coming in on one cheek, push the stick to the other side.
4. Keep flying speed!

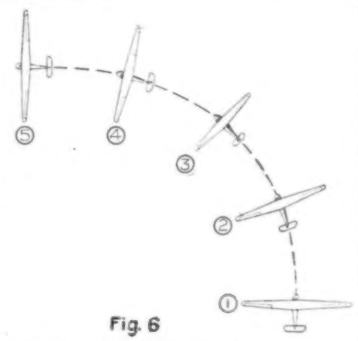

Fig. 6

STEPS IN MAKING A LEFT TURN
Plan View

1-Stick forward
2-Stick and Rudder left
3-Stick and Rudder neutral
4-Stick and Rudder right
5-Stick and Rudder neutral

CAUTION TO POWER-PLANE PILOTS

You are accustomed to allow for the torque on an airplane, whenever you make a turn. The glider, of course, has no torque, so that no additional pressure on the rudder-bar and stick is necessary in making a right turn.

How to Build a Stinson "Junior"

(*Continued from page* 13)

which are to be put on after the paint dries in the cabin. Take plenty of time and be very careful to see that the wing sets perfectly straight across the fuselage. Allow about half an hour for the ambroid to dry. When it dries, attach the other four windshield struts as shown in Numbers 1—5. Paint the inside of the six panels or struts gray, same as the rest of the interior. Let the paint dry for a few hours.

LANDING GEAR AND WING STRUTS

It is best to make the landing gear of spruce, white pine or other hard wood. Full size drawings of struts are shown in Numbers 5—6. You may streamline them with a razor blade, knife or sandpaper. After streamlining, drill a hole at one end in the two Number 1 struts and fasten a wire in each about one inch long in order to hold a wheel. After that is done, turn your plane upside down and fasten it in place with plenty of ambroid (Number 5). Then put the opposite struts, Number 2, in position. Continue with this procedure until all sixteen struts are in place, using blocks and sticks to keep them in position. It is very im-

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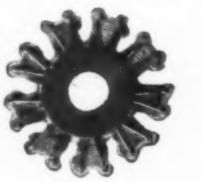

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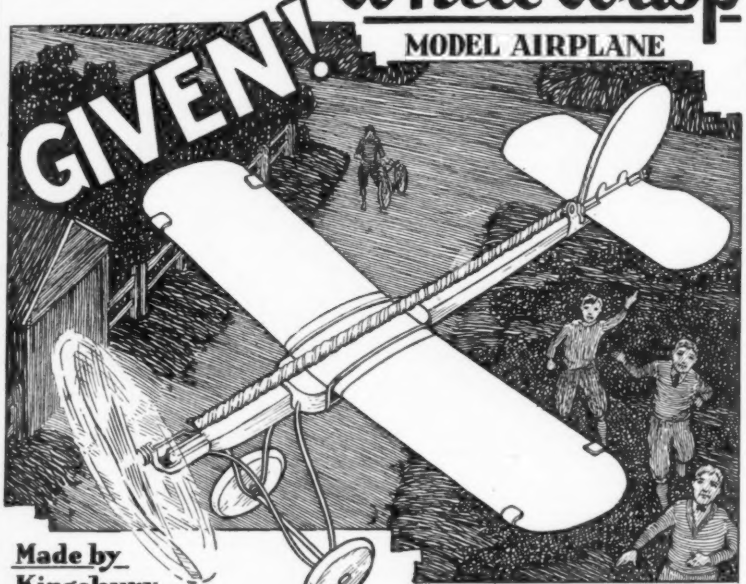

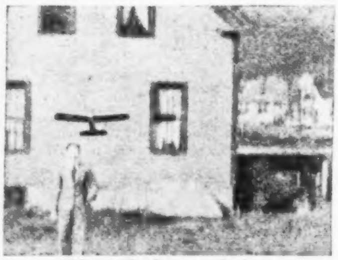
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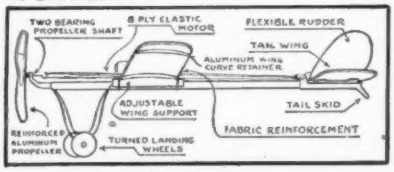

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portant that they are straight. The ambroid of the first one must be dry before you attempt to put on the next. Also attach steps. When you are all through, go over the connections with some more ambroid to make them firm.

TAIL UNITS

While you are waiting, connect the tail skid, using wire and a small wheel. Copper wire is the easiest to work with because of its flexibility. The wheel may be taken from a little lead toy truck which may be purchased at a "Five and Ten Cent Store." Drill a small hole in the end of the fuselage in order to let the tail skid fit tightly. Number 1 shows how the tail skid may be built and placed on fuselage.

Do not ambroid it so that it may turn in its socket. By that time the landing gear will have dried and you may turn the plane right side up. Then place the rudder and elevators on, after cutting a groove in the fuselage for them to fit. (Numbers 2—4.) Allow to dry half an hour and attach braces.

NOSE

The cylinders of the motor are cut from 3/8" x 1/2" x 3 3/8" balsa wood. Number 4 shows how this may be done. There are nine cylinders to be cut in shape. After that is finished, ambroid cylinders in place and attach the eighteen vertical struts (Number 4).

Make propeller while motor is drying, of 3/8" x 1/2" x 4 7/8" balsa wood, as shown in Number 3. Sandpaper to give a smooth finish, drill a hole for pin and paint the propeller silver. Cut a piece of aluminum with scissors and wrap it around nose. (Number 6.) Fasten with pins and then put on propeller. Use transparent paper, which may be obtained from a candy box, for the windows.

PAINTING

The wing should be painted red and white. The fuselage is red with two white lines painted down the side and one around the nose. Paint the landing gear and all other struts red with the motor, of course, black. Paint all the tail pieces red except the bottoms of the stabilizer and elevators, which are white. Use special colored dope.

MATERIALS

The dimensions and kinds of material to be used for this model are given in the text. Make up each part as you go along. Work carefully, and an excellent model will result from your efforts.

(COMING!)
Full-Size Plans for a ROTOR Flying Model
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A Course in Airplane Designing

(*Continued from page* 32)

can take place even though the nose of the ship is not pointed up at any time. Now let us suppose that the motor is on, pulling the ship through the air with full power. In this case the plane will have to nose up before stalling.

It will, if made to climb too steeply, finally reach an altitude at which the thrust of the prop is no longer sufficient to overcome the drag. This is really caused by the enormous increase in the drag of the wings when they reach a certain angle of attack, as we shall learn later in this article, but the effect is that the ship stalls, and with nearly all of its speed gone, drops to regain the needed flying speed.

However, how does a ship "drop" out of a stall? That's the catch. Here is the point where the skill of the designer comes in. If the ship is not properly designed it may fall off to one side, and possibly go into a tail spin, or it may slide backwards in the air, in spite of the efforts of the pilot.

Most full-size ships can of course be made to spin, but a well designed ship, when stalled normally, will nose down and pick up speed again, rather than go into a spin. Later we will discuss ways of designing a plane to make it do this, after we learn something of the increase in wing drag mentioned above.

Imagine an airplane wing striking the air at a small angle of attack. As we have learned before, the air will flow around the wing smoothly, and the greater part of the lift will come from the partial vacuum that is formed as the air tries to pull away from the upper surface of the wing.

Now suppose we increase the angle of attack. Gradually there comes to be more and more vorticity, or disturbance of flow, above and behind the wing. Every bit of of this disturbance adds to the drag of the ship, slowing it up, but as yet the lift has not fallen off greatly.

NOW, as we increase the angle of attack beyond a certain point, we find that suddenly the air pulls away from the upper surface of the wing, making a large region of whirling eddies. The point at which this sudden breaking away of air flow occurs is called the *burble point*. As shown in Figure 1, there is an extensive disturbance behind a wing that is beyond the burble point. Naturally, with this sudden pulling away of the air stream we have an instant decrease in the lift of the wing, and also an enormous increase in the drag, due to the very disturbed air flow.

The exact angle at which the burble point occurs differs with different wing sections, but is usually somewhere around fifteen degrees. Beyond this point further increase in angle of attack merely makes matters worse, since the lift decreases very rapidly and the drag increases correspondingly.

It is the burble point of the wing that determines the time of the stall. The wing will operate efficiently up to the burble point, but if the angle of attack is made larger, there is not enough lift to support the weight of the ship, and without enough lift to keep it in the air the plane drops until it picks up enough speed to recover its lifting force.

However, how about looping? Why doesn't an airplane stall every time it is looped? How about these pursuit ships that climb nearly vertically for thousands of feet? These questions all come to mind, and their answer is an important one to the airplane designer. It must be grasped before stalling can be fully understood. *The angle of attack of an airplane wing has no relation to the surface of the earth.* It is the direction of motion, and that only, that determines the angle of attack.

A ship may be flying level, glid-

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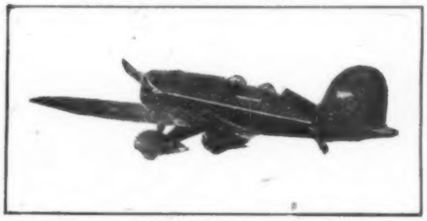

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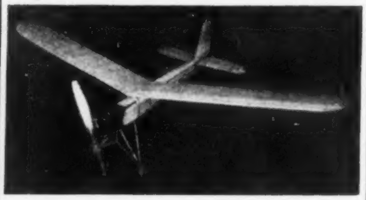

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ing, and yet it may stall, because its *direction of motion* may be at such an angle to the wing that the burble point is reached. Even though the ship itself is nearly level, it may be mushing through the air at a very large angle of attack, and ready to stall at any moment. Again, a plane may be climbing vertically to go into a loop, and yet it may not be stalling. Some very powerful ships may even climb vertically for some distance, because they have motors so powerful that the thrust actually overcomes the weight!

Ships of lesser power gain extra speed for steep zooms, loops, and other stunts, by diving under full power just before the maneuver. However, the thing to remember is that the angle of attack, in any case, depends wholly upon the true direction of motion of the ship.

For example, let us take a ship that is diving. The direction of motion is, of course, downward and, assuming a vertical dive, the relative air stream is upward and vertical. Now, if we pull our ship out of the dive, and put it into a vertical climb for a moment, the relative air stream is in effect coming from above, and, when we level out again, it is horizontal. I say relative air stream because it is really the ship that does the moving, but it is more natural and easier to think of the air as being in motion. The effect is exactly the same in either case.

NOR is the direction in which the ship is pointed always the real direction of motion with respect to the air. An airplane may be held level, nose on the horizon, and yet it may be actually moving downward, with a very high angle of attack. This is the case in a "pancake" landing.

There are several devices used to prevent stalling. One of the most well known of these is the Handley Page slotted wing. The idea behind the slotted wing is to put some device on the wing that will deflect the air down so that it will not pull away from the upper surface, as it is shown doing in Figure 1.

The wing shown in this sketch is not equipped with a slot. Note that the air is very much broken up behind the wing, so that there is very little lift and a great deal of drag. Now, suppose we place a small airfoil just above the leading edge of the wing, at the point where the air begins to break away, and design it so that it will deflect the air stream downward. Would this not enable the wing to operate efficiently at very high angles of attack, far beyond its normal burble point? It will, and does.

As we see in Figure 2, the slot operates as expected. Lift is reestablished, and the drag is brought more nearly back to normal. The slotted wing has been used in quite a few ships, and lately on the Curtiss *Tanager*, winner of the Guggenheim safety contest.

It is necessary, however, that the slot be made movable, since it is opened and closed. If it could not be closed three point landings would be very difficult indeed, as the ship would not stall until it reached a very high angle of attack, and this would necessitate a long landing gear, one that would make the ship look as if it were on stilts and add to the drag. That has been overcome by making the slots so that they may be opened and closed at will.

THE small surface is usually fastened to a shaft, about which it rotates, and it is made to fit over the upper leading edge of the main wing. Sometimes it fits into a slot in the wing edge. Another important device is one that opens the slots automatically when the ship approaches a stall. This should do a great deal toward the elimination of accidental stalls, although, of course, means must be provided whereby the pilot can close the slots for landing.

Trailing edge flaps, which are nothing more than extra long ailerons in form, greatly increase the efficiency of wing slots. These flaps extend all along the wing and may both be lowered at the same time. Figure 3 shows a wing equipped with both slots and flaps.

An important device that was used on the *Tanager* was the floating aileron. The great difficulty in airplane design has been to make a ship that could be controlled laterally in a stall, since one wing or the other usually tends to drop, and the usual ailerons are more or less useless at stalling angles. The floating ailerons, as shown in Figure 4, are at the ends of the wings, and are operated independently of the wing. Thus, even when the wing is at a very high angle of attack, both ailerons may be changed so that they are at a lower angle, and hence they retain full control.

How may we design a ship so that it will "behave" in a stall? How may we make sure that it will nose down normally, instead of falling off into a spin?

There is one thing, above all others, that will keep a ship from spinning. That is a long moment arm for the tail surfaces. By this I mean that the tail should be placed reasonably far back of the center of gravity, so that it will exert as much force as possible about the C. G. when the ship stalls.

Why do this? Simply because, in a stall, the center of pressure of the wing moves back, usually some distance, and, unless the tail surfaces have enough moment to overcome this unbalanced condition, the ship will not recover. However, don't overdo the thing. Make the tail of the ship reasonably long, and the surfaces reasonably large, and it will be found that the plane will recover quickly from stalls. If any trouble should occur, remember that an increase in tail area will help.

The American Sky Cadets

(*Continued from page* 31)

meet and judging from the way the boys and girls received it, it will not be the last. In this event a measured course of 150 feet was laid out and the model which crossed the 150-foot line in the fastest time was declared the winner. This honor fell to Robert Meagher, whose plane made the distance in just two seconds (a speed of fifty miles an hour), followed by that of Hy Kessler with 2 3/10 seconds and Frank Ziack with 2 8/10 seconds.

The very popular glider entries won the approval of everyone and much interest was taken in it as was shown by the large number of entries. Lusty cheers greeted each glider as it was launched in the air.

It was left for Jack Harris to carry off first honors with the distance of 526 feet; then Joseph Covel, not to be outdone, sent his ship 523 feet, and Joe Sarchiapone caused several anxious minutes when his sturdy craft went a distance of 517 feet for third place.

The Replica model event, as it is now called, was for scale models and gave the judges some real hard work trying to pick the three best models out of such an array of fine ones entered in this class.

Finally after much deliberation, the first award was given to Dante Algeri for his *Flying Dutchman* model; second place was given to Joe Battaglia for his Boeing Pursuit model, and third to Henry Orzechowski, for his Curtiss *Falcon*.

Prizes for the twin pusher event included the Clarence Chamberlin Cup, and Dale Jackson and Forrest O'Brine medals. No need to introduce Clarence Chamberlin and probably all of you know that Dale Jackson and Forrest O'Brine are holders of the World's Record for refueling-in-flight, which they made in St. Louis, flying a Curtiss *Robin* for 647 hours, 28 minutes, 30 seconds.

The prizes in the commercial model event were the Eddie Rickenbacker Cup and the Roger Q. Williams and Eleanor Smith medals.

Those in the speed event were the Amelia Earhart Cup and the Art Gobel and Al Williams medals.

The glider event prize went to Jack Harris and was a beautiful Frank Hawks' trophy. The Replica model contest prizes were the Casey Jones Trophy, the Lewis Yancey and Ruth Elder medals.

The title of Greater New York Model Plane Champion goes to Thomas Boland, well-known New York model plane builder and enthusiast. Thomas won two first places in the Derby, thereby being awarded the famous Richard E. Byrd Polar Plaque, given by the noted explorer and airman for whom it is named, while the Famous Flyer awards were also distributed to the lucky winners.

The meet conducted by *New York Graphic* Junior Aviation Club and American Sky Cadets was under the supervision of Mr. Walter R. Herrick, Commissioner of Parks; James Mulholland, Supervisor of Recreations, and Mr. Lawrence Shaw, leader of the *New York Graphic* Junior Aviation Club.

The judges, headed by Captain H. J. Loftus-Price, Editor of MODEL AIRPLANE NEWS, as chairman, included Mr. Charles Grant, of the Grant Aircraft Company, Keene, N. H.; Mr. David Newmark, of the Ideal Aeroplane & Supply Company; Mr. Armour Selley, of the Selley Manufacturing Company; and Mr. John Hultrunk.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, of JUNIOR MECHANICS AND MODEL AIRPLANE NEWS, published monthly at Dunellen, N. J., for October 1, 1930.

State of New York
County of New York } ss.

Before me, a Notary Public in and for the State and County aforesaid, personally appeared Capt. Harry J. Loftus Price who, having been duly sworn according to law, deposes and says that he is the editor of the JUNIOR MECHANICS AND MODEL AIRPLANE NEWS, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, Model Airplane News Publishing Co., 1926 Broadway, New York City; Editor, Capt. H. J. Loftus Price, 148 West 78th St., New York City; Managing Editor, Edith L. Becker, 1314 Riverside Drive, New York City. Business Managers, none.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given) Model Airplane News Publishing Co., 1926 Broadway, New York City. Stockholder: Macfadden Publications, Inc., 1926 Broadway, New York City. Stockholders in Macfadden Publications, Inc., Bernarr Macfadden, Englewood, N. J.; O. J. Elder, 276 Harrison St., East Orange, N. J.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is ....(This information is required from daily publications only.)

(Signed) H. J. LOFTUS PRICE, Editor,

Sworn to and subscribed before me this 22nd day of Sept., 1930. WESLEY F. PAPE,
(SEAL) (My commission expires March 30, 1932)

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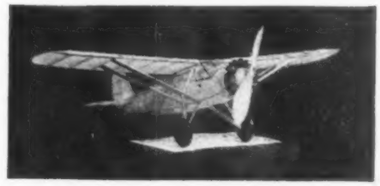

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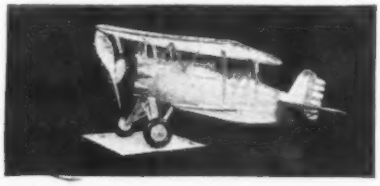

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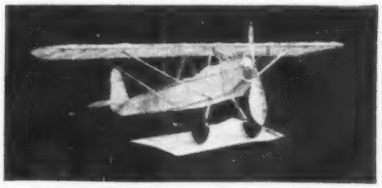

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How to Stunt Your Models by Automatic Control

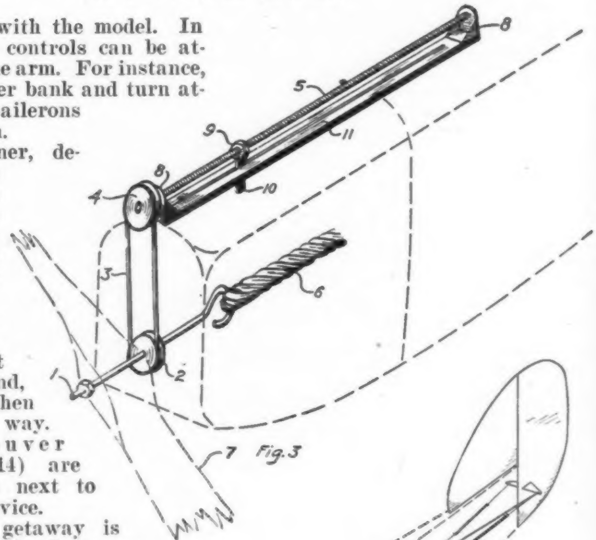
(Continued from page 34)

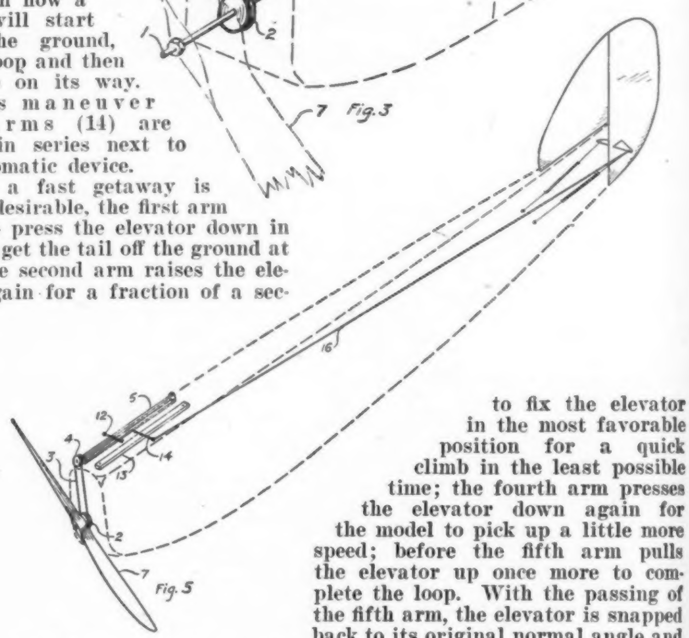
intend to make with the model. In some cases, two controls can be attached to the same arm. For instance, to obtain a proper bank and turn attach rudder and ailerons to the same arm.

In this manner, depending on the number of arms attached to the side of the device, the model will execute any desired stunt.

In Figure 6 it is shown how a model will start from the ground, climb, loop and then continue on its way. For this maneuver five arms (14) are placed in series next to the automatic device.

Since a fast getaway is always desirable, the first arm is set to press the elevator down in order to get the tail off the ground at once; the second arm raises the elevator again for a fraction of a second only in order to get the model off the ground; the third arm is set to fix the elevator in the most favorable position for a quick climb in the least possible time; the fourth arm presses the elevator down again for the model to pick up a little more speed; before the fifth arm pulls the elevator up once more to complete the loop. With the passing of the fifth arm, the elevator is snapped back to its original normal angle and the model continues on level keel until motive power is exhausted.





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25 sticks 1/16x1/4x40″	.50 or 2 sticks for 5c
25 sticks 1/16x1/16x40″	.35 or 3 sticks for 5c
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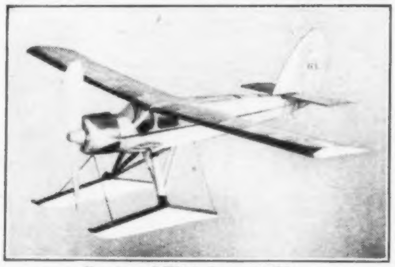

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You will find the answer to this perplexing puzzle in the January Issue of YOUR HOME Magazine, in the article "Moderate Priced Furnishings for Limited Budgets." It is an amazingly clear and practical article that tells you how to get real value for every cent you spend in furnishing your home. For instance, it explains how shelving and built-in cupboards can be converted into a dressing room. It shows how a nest of small tables will furnish an odd corner effectively. You learn from it that new moderately priced furniture or possibly dual purpose furniture has a sturdy beauty, and how in the end, a very little money can be made to go a long, long way.

And speaking of puzzles, here is the answer to another. Anyone who has ever remodeled a house knows that it cannot be done as simply as "two and two are four." Sometimes there just isn't room for an old house to spread out a new wing. "Four Little Houses and How They Grew," which appears in this same January issue tells of truly ingenious ways in which a quartet of home owners met and solved real puzzles in addition. And then there is an article for the gardener of the family. The story of a demountable greenhouse to shelter winter blooms, one that can be deftly converted into a sunny open porch for summer.

YOUR HOME Magazine strives above all things to mirror the interests of the home owner and the home manager who know the pleasure of an up-to-date and characterful home of moderate cost. The houses and plans in the pages of the January issue reflect this aim, the illustrated notes on new furniture styles, the architectural article that further discusses traditional American homes will further deepen your interest and knowledge of architecture and decoration.

Watch for it; read it, and learn how informative, reliable and readable a truly helpful magazine can be.

YOUR HOME, a Macfadden Publication, 25 cents a copy.
On All News Stands December 23rd.

Macfadden Aviation Advisory Board

(Continued from page 35)

the National Advisory Committee for Aeronautics at Langley Field.

In the early part of 1926, his original plans were submitted to the Curtiss Aeroplane & Motor Co., and the company began its development. There followed a year and a half of research and wind tunnel testing to determine its flight possibilities.

Incidentally, immeasurable difficulties were encountered in making an intelligent engineering analysis of the problem. As an example, the hovering condition of flight, in which the machine remains stationary in the air over a given point, could not be simulated with the regular wind tunnel equipment and it was necessary to devise special methods and build special apparatus for this and a number of other tests of the machine.

As another example, the cooling of the engine operating in its rather unusual position, without the cooling effect of the usual propeller slipstream, presented difficulties and it was necessary to make a very thorough study of the problem of cooling and cowling design, which became a major problem in itself although really distinct from pure helicopter design.

Another year was spent in the detailed design of the machine and here, again, it was necessary to devise entirely new methods particularly in making stress analyses for the unusual conditions encountered. All of this work was done under Mr. Bleecker's supervision.

This first machine has been designed primarily to meet these general requirements satisfactorily and has not been specifically designed to accentuate any particular feature of performance such as high speed, or rate of climb, or load-carrying ability, as is done in design of present-day aircraft.

Such specialization can be accomplished once the general principles of the machine are established as correct.

—o—

I am indebted to the Department of Commerce, Aeronautics Branch, Washington, D. C., for the following data concerning glider pilot licenses. This will answer many of the questions asked on this subject.

Three types of glider pilot licenses are provided for—student, non-commercial and commercial.

Glider student permits, authorizing the holder to receive instruction and to solo licensed gliders while under the jurisdiction of a licensed glider pilot, will be issued by Department of Commerce inspectors and divisional offices upon application. No physical or written examination will be required. A form has been drafted which is both an application and student permit. These

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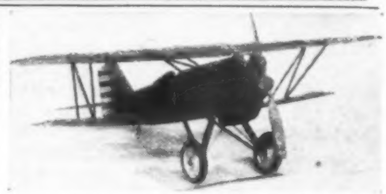

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forms may be obtained from any Department of Commerce inspector or divisional office.

The non-commercial glider license will serve the group that is desirous of operating gliders only for sport and pleasure. This license parallels, to a degree, the private airplane pilot license. The only examination required for this license will be a flight test which will consist of a minimum of three flights including moderate banks in either direction. Applications for non-commercial glider licenses may be made on regular pilot application forms obtainable from Department of Commerce inspectors or divisional offices.

The commercial glider pilot license will be issued to all applicants physically qualified who successfully accomplish the flight test involved. Applicants for the commercial license are required to pass a physical examination the same as is now required for the private airplane pilot license. There is no written examination.

The flight test for the commercial glider pilot license, in addition to normal take-offs and landings, includes a series of general and moderate banks, 360 degree turns and precision landings.

The glider pilot licenses will be issued to all grades of airplane pilots on a satisfactory completion of the tests involved.

Applications for the commercial glider pilot license also may be obtained from Department of Commerce inspectors or divisional offices.

—o—

Continuing the list of world war aces and the number of enemy planes brought down:

British—(living)

Lieut. R. T. C. Hoidge	14
Capt. Murray Galbraith	13
Lieut. Joseph S. Fall	13
Lieut. A. J. Cowper	12
Lieut. Alan Gerard	12
Capt. Whitaker	12
Lieut. M. D. G. Scott	11
Capt. Robert Dodds	11

British—(killed or wounded)

Capt. James McCudden	58
Capt. Donald E. McLaren	48
Capt. Albert Ball	43
Capt. W. G. Claxton	37
Capt. Brunwin-Hales	27
Capt. Francis McCubbin	23
Capt. G. E. Thomson	21
Capt. J. L. Trollope	18
Capt. Stanley Rosevear	18
Lieut. Leonard M. Barlow	17
Capt. Walter A. Tyrrell	15
Capt. H. G. Reeves	13
Capt. Noel W. W. Webb	12
Lieut. Clive F. Collett	12

Italian—(living)

Lieut. Flavio Barachini	31
Lieut. Ancilotti	19
Col. Piccio	17

(*To be continued*)

Now to a few questions and answers:

Dear Sirs:

I am building a home-made two place cabin monoplane and I would like to have the measurements of the Monocoupe made by the Mono-Aircraft people.

Could you tell me what dihedral means?

Yours truly
Robert Gilmore
1108 E. Center St.
Springfield, Mo.

Answer:

The Monocoupe has a span of 32 ft., length of 20 ft., and height of 7 ft. For further data about this machine, we would suggest that you write to the makers, the Mono-Aircraft Corporation, Moline, Ill.

The dihedral angle is obtained by inclining the main wings of an airplane up from the center of the fuselage so that the tips are higher than any other portion of the wings. This angle is measured from the chord of the wing to a line drawn perpendicularly at the intersection of the two wings, if they were elongated equally at the fuselage until they met.

Back Issues of MODEL AIRPLANE NEWS

Back issues of MODEL AIRPLANE NEWS can be obtained by writing to the Subscription Fulfillment Department, MODEL AIRPLANE NEWS, 1926 Broadway, New York City, and enclosing 20 cents to cover cost of postage, etc.

Be sure to write your *full* postal address with each order.

Dear Sirs:

Which fly better and why: a low-wing, a high-wing or a biplane, all with the same motor and weight?

Yours truly
Julius Baugh
Box 292,
Duncan, Okla.

Answer:

It depends entirely on design and streamline to decide which is the better type of plane. If built absolutely for speed, then the low-wing monoplane would probably excel.

Gentlemen:

Can you give me the names of the members of the Byrd Expedition, such as the aerial photographers, surveyors, navigators and pilots and, if possible, the land they covered?

Yours truly
Leonard Desnoyer
29 Carter Street,
Danielson, Conn.

Answer:

The aerial photographers, surveyors, pilots, etc., in the Byrd Antarctic Expedition were as follows:

Dr. Lawrence M. Gould—geologist and geographer

Capt. Ashley C. McKinley—aerial photographer

Bernt Balchen—air pilot

Lieut. Harold I. June—air pilot

John S. O'Brien—surveyor

Capt. Alton U. Parker—air pilot

Joseph T. Rucker—motion picture photographer

Dean Smith—air pilot

The Expedition arrived at the Ross Ice Barrier, 2,300 miles from Dunedin, New Zealand. They established a base on the Barrier on January 6, 1929, and called it Little America. Admiral Byrd, then holding rank of Commander, made his first Antarctic flight on January 16 when he explored an area of 1,200 sq. miles. A month later he penetrated further into the unknown region surrounding the South Pole, circling an expanse of 40,000 miles. Bernt Balchen, chief pilot, Dr. Lawrence Gould, geologist, and Harold June flew on a geographical trip on March 8 to the Rockefeller Mountain range, where they were marooned by a severe storm and rescued by Byrd on March 22. A party of scientists made a 400 mile trip by dog-sled into the Queen Maude Mountains. On November 28, Byrd with three companions set out for the Pole and reached it the next day. The return flight was made the same day, no landing being attempted.

Dear Sirs:

Will you please explain how the air-cooled and water-cooled engines work?

Yours truly,
Bob Smith
Red Cloud, Neb.

Answer:

The term "air-cooled" with respect to motors denotes, of course, that the engine is prevented from overheating by permitting the excess temperature to be carried away by the air through which the engine moves. To effect this, the cylinders in which the gas charge is ignited are provided with a number of radical flanges, which serve to absorb and dissipate the heat caused by the explosion.

By "water cooled" engines is meant those in which a water jacket is provided to absorb the heat from the engine and carry it to the radiator. The heated water passes through the radiator, cools and returns to the engine to withdraw a new supply of heat. This system is used in practically all automobiles today and is doubtless familiar to you.

Special Course in Air Navigation

(Continued from page 23)

290 degrees and airspeed 90 m.p.h., and that your wind has been from 230 degrees at 25 m.p.h.

With your north and south line drawn, you draw line AB 90 miles to scale in a direction of 290 degrees, and then your wind line AC 25 miles to scale *from* the direction of 230 degrees. Note that in this case you must draw your line from the direction in which the wind blows.

A little thought will make this clear. If the wind is against you somewhat, as it is here, your groundspeed will, obviously, be less than your airspeed and your track line must, therefore, be shorter than your course line. Having drawn your lines AB and AC you connect CB together and the direction of the line thus drawn will be your track and the length of it to scale is your groundspeed. In this example, 307 degrees at 81 miles per hour.

These are three examples of the triangle of velocities worked out, but there are one or two points that should be borne in mind in connection with them. The first thing you will say is that it is impossible for you to make all these calculations in the air, and so it would be if you were piloting and had no co-pilot.

However, there is in existence an instrument in the form of a circular slide rule, whereby all these calculations can be made easily as you sit at the controls.

Then also, the calculations as to the course you must steer to make good a certain track will be made on the ground before you start. You can obtain your windspeeds and directions beforehand from stations along your route, and unless there are long distances between stations, the wind velocities in between will generally not alter appreciably. Be sure you fly constantly at the height for which you have calculated your windspeed, which varies at different altitudes. Also take care that the bearings on which you base your workings are either all magnetic or all true. Do not confuse one with the other.

THIS MONTH'S QUESTIONS

1. What is the angle of drift?
2. Find the course to steer to make good a desired track of 45 degrees. Your airspeed is 80 miles per hour and the wind is from 270 degrees at 20 miles per hour.
3. Find the windspeed and direction when your course is 160 degrees and airspeed 90 m.p.h., and your track is 175 degrees and groundspeed 70 miles per hour.

LAST MONTH'S ANSWERS

1. When you are heading on a direct course for a transmitting station, your main coils, being in a direct line with the path of the wireless wave, will receive a maximum current, while your auxiliary coils, being at right angles to the wireless wave, will receive no current. Consequently, whichever way you turn your switch with the fixed coil method, whether to include your main coils only or both main and auxiliary, you will hear signals of the same power. Heading slightly off your course, the auxiliary coils will also pick up some signals and the same strength signals will not be obtained when you move your switch.
2. The advantages offered by the Bellini-Tosi method of wireless direction are that no special apparatus, beyond the ordinary receiving and transmitting set, has to be carried in the air, and that no calculations have to be made in the air. Further, in the case of an airplane carrying a ground radio set, in the event of a forced landing on sea or desert where difficulty would be experienced in giving exact position, by this method the precise location of the plane can be found.
3. Two vertical aerials joined together at the top and bottom form a loop aerial. When the two aerials are in a position, one behind the other in the direct path of a wireless wave, a stronger voltage is set up in the first than in the second aerial, and an electric current passes between the two which is passed on to the headphones in the form of sound. When the aerials are at an angle of 90 degrees to the wireless wave, a similar voltage is received by each and no electric current is set up, and no sound transmitted to the headphones.
4. A rotating wireless beacon is a frame based on the loop aerial principle which rotates one complete revolution at a uniform rate every 60 seconds. A signal is sent when the beam is directed to true north and another when it is directed to true east. With a stop-watch, a pilot is able to record the time of signals received by him and so find his bearing from the beacon.
5. If you are in a position due north or south, or approximately so, of the rotating beacon, you will not be able to hear the north and south signals. Similarly, if you are east or west, you would not be able to hear the east and west signals, but whatever your position, you can always pick up one of the two. The essential point of this method is that when the beam is pointing directly at you, no signal will be heard, so that when you hear the north signal sent, you start a stop-watch, and as soon as the signal has died away into "nothingness," you stop it. As during each second the beacon turns over an angle of 6 degrees, you multiply the number of seconds on your watch by 6 and the result will be your bearing *from* the rotating beacon. If you had started your stop-watch from the time you heard the east signal, you would add 90° to the bearing so obtained, because the beacon had already rotated 90 degrees before you started the watch.

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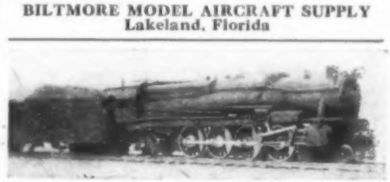

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The Mystery of the Silver Dart

(*Continued from page 7*)

You get some sleep in on the way down and I'll stew over this thing. Incidentally, I have solved one thing, and that is how you received this. There is a wireless set in or very near Commander Stevens' house and what you heard was the sparking of the aerial while the message was being sent. See what I mean? . . . This message was sent FROM COMMANDER STEVENS' HOUSE!"

With that, the Genii dug Ian in the ribs, gave the engine the gun and taxied to the far end of the field for the take-off. Soon they were tootling to Washington at 120 miles an hour while during the flight Ian did as he was told—slept.

An infernally dense morning mist was Captain Yubanks' lot for the last hour of the flight, but thanks to the government's foresight, all planes had been fitted with television sets which reproduced on a frosted glass plate in the cockpit a miniature map of any landing field asked for by a pilot. A full set of instruments for "blind flying" also was carried, so the Genii didn't worry much, although flying through fog or mist of any kind is far from pleasant.

NEARING Washington, he tapped out a message on his wireless set asking for a television map of the field and immediately before him on the plate there appeared his answer. Everything was clearly depicted, despite it being in miniature, as if the sun were shining brightly and he were looking down on the field.

His own natural flying sense, plus the instruments, permitted the Genii to make a landing without so much as a slight jar, and it was only the jolting of the tail-skid over a few ruts in the ground that awakened Ian.

After they had reported in and had left the office, the Genii turned to Ian.

"Listen, Ian," he said, "the best thing I can think of for you to do is to take this message to Admiral Beecham. Tell him everything you told me. If there's anything in it at all, the Admiral will be able to dig it up. And I'd make it snappy, if I were you."

Ian nodded in agreement.

Within a few moments they had reached their quarters, where Ian changed to parade dress. Following this he went straight to the squadron office and there asked permission to go into Washington on important but personal business. Permission was obtained without difficulty and after the necessary passes had been filled in, Ian drove to the office of Rear-Admiral Franklin J. Beecham, Chief of the Investigation Department of the United States Naval Air Ministry.

Ian entered the admiral's private office. They shook hands and without even the formality of "How do you do, sir," Ian blurted out, "The mystery plane . . . this paper, sir . . ."

The admiral's jaw dropped. Wasn't that sufficient cause? For before he had even recovered from that terse note from the Board of Air Strategy warning him of what was tantamount to disgrace if he did not recover the *Silver Dart*, here was another development from an entirely different quarter, and an unexpected one, too.

"WELL," he remarked after a long pause, "It's like this, Lieutenant. Either this is a brainstorm on your part or there really might be something in it. IF it's just a brainstorm, you are in for a lot of trouble and you'll never live it down, I'm afraid. If it leads to something . . ."—the admiral shrugged his shoulders.

"Return to your squadron and without letting it be known, make every preparation for a hurried call from me. I might have some news for you in a day or two. Meanwhile I'll get this message decoded or solved in some way, and then we'll see what's what."

A few moments later they parted. Needless to say, to Ian every second seemed like a year until he heard from Admiral Beecham. You can imagine, then, Ian's joy when on the following morning, he was called to the adjutant's office.

Fortunately for Ian, he was prepared. Otherwise it is more than likely he would have dropped with amazement at the greeting he received.

"Looks as if you're in for it, old son," said the adjutant to Ian. "Read this note from the I. D. (Investigation Department)." He passed Ian a letter which, in part, read:

"Certain matters have been brought to our attention concerning the qualifications of Lieutenant Ian Potter relative to his graduation from Kelly Field . . . He, therefore, will report to this office at 10:30 A.M. Tuesday next to answer certain questions in person . . ."

As a matter of fact, Ian did wonder what was happening. It was true that a certain amount of leniency had been shown him in view of his father's record and his own prowess prior to entering the cadet school. However, he said nothing, saluted, left the office and soon was on his way to Admiral Beecham's headquarters again.

ONCE there he was hurried through to the admiral.

"Hello, young man," said this worthy, beaming and greeting Ian effusively. "That was quite a good ruse on my part to get you to headquarters without arousing suspicion, wasn't it?

"Let's get right down to business," he went on.

"The wireless message you happened on, if followed up properly, might lead to great things for you and everybody concerned in its solution. It was a code message, as you are aware, but its duplicity lay in its simplicity."

The admiral then outlined the details concerning the *Silver Dart* and its disappearance, what the government feared, and how imperative it was that the plane be recovered before it could be taken apart and duplicated by a foreign power.

"Now, as regards the message. After twenty decoding experts had racked their brains and used every key known, it was at last solved as a first letter code—that is, using the first letter of each word group, the message read:

"'. . . **eware. Send plans Klawgob.**"

"Obviously you had started taking down the message somewhere in the middle. Also, the first two letters of the first group of five were missing. Equally obvious from the remaining letters, the word must be 'beware.'

"Now, who should 'beware' and why? Furthermore, WHERE should they send the plans—and what plans?

"You see, the message as it stands leads to a lot of conjectures. This department usually is not given to what is termed 'playing hunches,' but the decoding of that word '*Klawgob*' has convinced us that, for once, we might try 'playing a hunch.'

"That word, incidentally, stumped everybody for hours, until one of the decoding experts, a former newspaper make-up man and hence able to glance at words written backwards and read them easily, suddenly put forth the suggestion that that word —'*Klawgob*'—read backwards might mean something. Backwards, as you can see, it reads '*Bogwalk*.'

Plagiarism

Stories have been submitted to* Model Airplane News *which are copies of stories that have appeared in other magazines.

Anyone submitting a plagiarized story through the mail and receiving and accepting remuneration therefore is guilty of a Federal offense in using the mails to defraud.

The publishers of* Model Airplane News *are anxious—as are all reputable publishers—to stamp out this form of theft and piracy and are advising all magazines from which such stories have been copied of such plagiarism, and are offering to cooperate with the publishers thereof to punish the guilty persons.

Notice is hereby given to all who have submitted or who submit stories that the same must be ORIGINAL.

"However, to make this talk short, after searching through all dictionaries, encyclopedias and gazetteers, we reached the conclusion that the word refers to Bog Walk, a village near Spanish Town, the old capital of Jamaica in the West Indies."

For some time after this, the admiral went into detail concerning the possibilities and developments, and gave Ian full instructions.

"We've got to do this thing properly," he had warned Ian. "So far as anybody is concerned, the net result of your visit to me is that you have been asked to relinquish your commission owing to the fact that something—some breach of red tape, we'll say—has offended the Air Ministry, and you are just the goat. Not even your mother must know.

"Furthermore, when you leave the service you will return, to all intents and purposes, to civil life, searching for employment in your own line just like any other man of your age and ambitions.

"Now go back to your airdrome and act exactly as developments call for."

Ian's and everyone else's feelings would be better respected by glossing over the leave-taking and farewell dinner at the mess on Ian's last night there. Suffice it to say that a crash from 5,000 feet would have been much more to the point, so far as Ian was concerned.

It did not take Ian long to settle down in New York.

He registered at the McYork Hotel and soon was besieged by newspapermen asking for more details than had been carried by the Washington papers.

Left to his own devices, Ian soon began to carry out instructions, and to formulate plans for recovery of the *Silver Dart*—if this ship were at all discovered.

IT was two o'clock in the morning before he decided on the idea of a non-stop flight to Kingston as a means of getting him there and with the ulterior motive of being allowed to do as he pleased without causing people to wonder what he was doing.

"Too many cooks spoil the broth," was the first thought that ran through his mind as he sat trying to think of a crew for the flight. So that, after working out all angles, he decided to take with him only one companion as navigator and radio man.

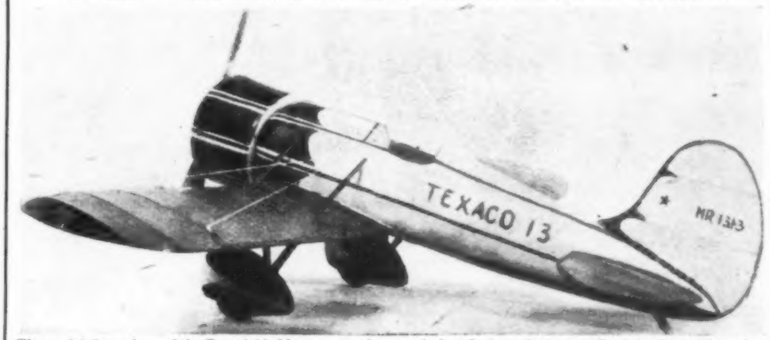
As if in answer to his thought, there burst in his room an old pal, Ruddy Arnold, with whom Ian had gone to flying school, and who had remained steadfast through it all.

Mournful Moe, for such was Ruddy's nickname, given to him because of his ever-serious mien, answered in characteristic style.

"Oh, nothing. When is there any reason for anything, anyway? How's the Old Sock?" Ruddy settled himself in an easy chair.

Ian then launched into details of the proposed flight to Jamaica, saying nothing whatever to Ruddy about the real purpose behind his

THE TRAVEL AIR MYSTERY SHIP!



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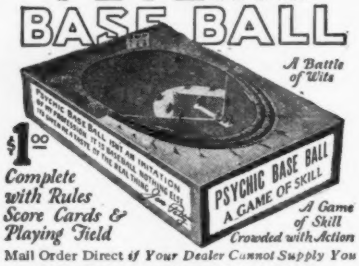

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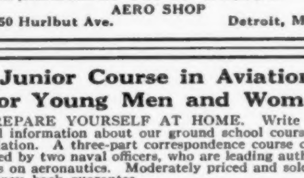

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project. Ruddy became as enthusiastic as Ian by the time he had finished outlining the plans.

"Now," said Ian at length, "you know Edwin Davis, the Texas oil man fairly well, don't you? Good. All right, your job is to borrow from him his old Fokker J-5. You know, the plane he bought for private travel but which he had put in a hangar and has never used."

Ruddy was all action now, and by the end of the week and after an exchange of telegrams, he had obtained permission to use the plane on condition that he bought it after the flight, if successful. This was agreed on.

Then came days of test flights. Days in which the gas and oil consumption was checked, the instruments checked and everything done to see that the plane was absolutely trim to the most minute degree for the flight.

Then came the day.

THEY were up and about at eight o'clock next morning, and after a hearty breakfast went to the hangar for a last and thorough inspection of the plane. This done, they ordered it to be wheeled out to the slipway, where the engine was warmed up.

Ian gave the signal for the mechanics to let the plane down the slipway and onto the water, and as it began to float he noticed, with dire mutterings to himself, how low the floats sank in the water.

"That's not going to make it easy to take off," he mumbled—and he was right.

The water was nice and choppy, but not rough, as he taxied downwind for the take-off. He turned into the wind and pulled back the throttle, letting the propeller just tick over.

Looking back over the top of the extra fuel tank to Ruddy in his special navigating compartment in the rear of the fuselage, Ian yelled:

"All right, back there?"

Ruddy nodded.

"Okay, we're off!"

Slowly he pushed forward on the throttle.

"Gosh, gee, heck! Will she never take off?" he complained. "Come on, old bird, upsadaisy," he cajoled.

Finally, and after what seemed an age, the old Fokker did it. Two inches—bump on the water—four inches—bump—one foot—two—five—ten—fifteen—clear at last!

Meanwhile, he wondered whether the engine had become overheated by the severe strain of the take-off. Its roar sounded good, but one could never be too sure.

Ambrose Lightship lying off New York Harbor was soon picked out, and there Ian steered the plane on to a course 182 degrees.

Soon the American coastline vanished from view and they were well and truly on their way. The engine had come up to all expectations and was purring like a sleek and comfortable cat.

Four hours out they sighted a steamer, and Ruddy, who had been wirelessing to shore stations telling them of the plane's progress, broke off to call the steamer and ask for its position.

This received, he checked it with his chart and found that they were on their course.

"All well," he wirelessed down, "feeling perky and making good our course 182. Altitude 2,000 feet."

The reply from the wireless operator on the steamer was typical of the sea:

"GLOM." That was all, but it meant—G ood L uck O ld M an. It was sincere, too.

Shortly before nightfall, Ian called for relief and Ruddy clambered over the top of the tank and took the stick. Ian lolled back in his seat and munched a sandwich and drank some black coffee.

Neither spoke. It would have meant yelling, anyway, to be heard above the roar of the engine. Each, however, was thinking of the same thing. Everything had gone along swimmingly up to now and if it kept up like this—well, what's an old flight to Jamaica, anyhow?

Ian prepared to take over again, but before doing so scribbled a note to Ruddy.

"Now's the time, old son. We ought to pick up South Point Lighthouse, Long Island (in the Bahamas) about 1:30 A. M. Give me a pin-point reckoning every hour—and don't use a match to see if there's any gas in the tank. Thanks."

RUDDY read it, nodded, and dug Ian in the ribs before clambering back into his compartment.

Thereafter, every hour religiously, he would pull open the zipper panel in the roof of the fuselage and take a bearing on the stars, and also once in a while check the drift with a flare.

Secure in the belief that everything was going splendidly, neither noticed the small dark clouds accumulating to the east and ahead of them. Night came on and to be sure that everything would be all right, Ian put the plane into a steady climb and held her there until the altimeter showed 10,000 feet.

"That will give us plenty of margin to mess about in if any trouble should arise during the night," he said to himself.

Two hours later they were fighting for their lives in a battle against the elements such as never had been imagined by either of them!

Nature seems to be in league with the unknown foes awaiting these brave lads at their destination. Beset as they are with the most trying circumstances that ever threatened a flyer, able as he might be, who knows if they will live to match their wits against their human opponents? The next instalment will make you gasp for breath! Don't miss the February issue of Model Airplane News, *on sale at all news stands January 23, and only 15 cents a copy.*

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From Weakling to Wrestling Champion

The True Story of a Sickly Orphan Boy Who Gained Millions by Gaining Perfect Health

IN a Missouri log cabin more than sixty years ago was born a lad who from the very first seemed doomed to being an invalid. He did not inherit the sound body with which most boys begin life because neither his mother nor father were very strong. In fact, before the boy was really old enough to look after himself both parents died and he was taken away to live with relatives.

Now, no matter how kind your relatives may try to be they can never give you the sympathy and love and care of a father and mother. So this lad grew older but instead of gaining strength he grew steadily weaker. And one night when they thought he was asleep he heard them talking in the next room. They said he was going to die.

But he didn't! Even then, before he was in his teens, he had amazing willpower. He refused to give up. After a little while they sent him to a farm. He had to do work far beyond his strength. He gritted his teeth and stuck to his job. The outdoor life was a tonic. He started to gain weight and strength!

Before long he was doing a grown man's work every day. He became interested in athletics. He began to train himself, figuring out his system as he went along. He took up wrestling to test his strength against the strength of other fellows.

Then the time came when he challenged the heavyweight wrestling champion of Chicago. Now this champion was a noted athlete. He had defeated all the best amateurs in the Middle West and he was more than twenty pounds heavier than this unknown lad who had challenged him. The sportswriters laughed at the match. Some even sought to prevent the affair, saying it was too one-sided.

But when the big night came and the men locked grips on the mat, the experts were amazed. Minutes, more than an hour, went past as the men struggled for a fall. Then—Bernarr Macfadden won! The boy who a few years before was considered too weak to live was a champion. He had licked a bigger man to gain the title!

Bernarr Macfadden had conquered his opponent against big odds and single handed just as he had conquered sickness. No wonder he was proud. No wonder he decided that thousands of other weak, sickly folks would be eager to learn his system of health building. So he started a gymnasium, one of the first in the country, and people who had heard of his skill flocked to put themselves under his care.

About thirty years ago he decided to make his knowledge available to people who could not come to him in person. That is why he published PHYSICAL CULTURE—the magazine which is the foundation of the publishing business which has made him a millionaire. For three decades it has explained, month by month, his rules for gaining manly, vigorous strength and health.

If you already have a strong body, Bernarr Macfadden will help you make it even stronger and show you how to keep your speed, force and health. If you, like he did, are struggling against weakness and sickness, he will aid you to grow strong just as he did. It is the sort of help in which he has specialized for years with wonderful success. Become his pupil today by reading the current issue of PHYSICAL CULTURE—on sale at the nearest news stand.

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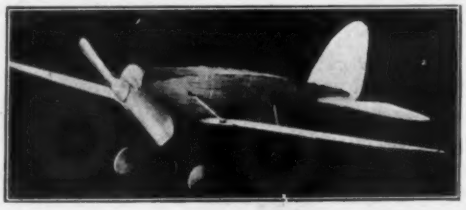

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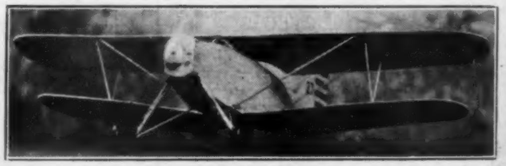

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